

# DRAFT QUALITY ASSURANCE PROJECT PLAN

FOR THE

## RIVERSIDE AVENUE SITE

NEWARK, ESSEX COUNTY, NEW JERSEY

*Prepared for:*

**U.S. Environmental Protection Agency Region 2**

Hazardous Site Cleanup Division

290 Broadway

New York, New York 10007

*Prepared by:*

**Tetra Tech EM Inc.**

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Newark, Delaware 19713

EPA Contract No. EP-S7-06-01

Task Order #: 0115

January 24, 2011

In accordance with:

**Intergovernmental Data Quality Task Force**

**Workbook for**

**Uniform Federal Policy for Quality Assurance Project Plans**

**Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs**

**Part 2A: UFP-QAPP Workbook**



This workbook supplements Part 1 of the UFP-QAPP, the UFP-QAPP Manual. Proper completion of these worksheets requires knowledge of the QAPP elements explained in the Manual.

Final

Version 1

March 2005

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# **WORKBOOK FOR UNIFORM FEDERAL POLICY FOR QUALITY ASSURANCE PROJECT PLANS**

## **INTRODUCTION**

This *Workbook for Uniform Federal Policy for Quality Assurance Project Plans* is Part 2A of the *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP). It provides examples of worksheets to assist with the preparation of QAPPs in accordance with Part 1 of the UFP-QAPP (the UFP-QAPP Manual) and Section 6 (Part B) of *Quality Systems for Environmental Data and Technology Programs - Requirements with guidance for use*, ANSI/ASQ E4 (February 2004). This Workbook may be used by the lead organization and its contractors to assist with the preparation of QAPPs for environmental data gathering activities.

Each worksheet addresses specific requirements of the UFP-QAPP. Both the UFP-QAPP Manual and the Workbook are intended to be comprehensive and are not intended to be program-specific. Since the content and level of detail in a specific QAPP will vary by program, by the work being performed, and by the intended use of the data, specific worksheets may not be applicable to all projects.

The ultimate success of an environmental program or project depends on the quality of the environmental data collected and used in decision-making, and this may depend significantly on the adequacy of the QAPP and its effective implementation. It is recommended that the individual worksheets included in this Workbook be taken to the project scoping and planning sessions. The use of the worksheets will aid in identifying the critical project information that will ensure that the right type, quality, and quantity of data are collected to meet all of the project's quality objectives. Though the format of each worksheet is not mandatory, the information required on the worksheets must still be presented in the QAPP, as appropriate to the project. In addition, QAPP preparers are encouraged to develop additional tables, as appropriate to the project. Sufficient written discussion in text format should accompany all tables. Certain sections, by their nature, will require more written discussion than others. In particular, Section 3.1.1 should provide an in-depth explanation of the sampling design rationale, and Section 5.2 should describe the procedures and criteria that will be used for data review.

**QAPP Worksheet #1**  
**(UFP-QAPP Section 2.1)**  
**Title and Approval Page**

**Site Name/Project Name:** Riverside Avenue Site

**Site Location:** Newark, NJ

*Document Title:* Riverside Avenue Site QAPP

*Lead Organization:* EPA Region 2

*Preparer's Name and Organizational Affiliation:* Kevin Scott, Tetra Tech EM, Inc.

*Preparer's Address, Telephone Number, and E-mail Address:* 240 Continental Drive, Suite 200, Newark, DE, 19713

*Preparation Date (Day/Month/Year):* 1/24/2011

Investigative Organization's Project Manager/Date: \_\_\_\_\_  
Signature

Printed Name/Organization: Ildefonso Acosta/EPA Region 2

Investigative Organization's Project QA Officer/Date: \_\_\_\_\_  
Signature

Printed Name/Organization:

Lead Organization's Project Manager/Date: \_\_\_\_\_  
Signature

Printed Name/Organization: Alicia Shultz/Tetra Tech

Approval Signatures/Date: \_\_\_\_\_  
Signature

Printed Name/Title: Sara Legard/QA Manager

Approval Authority: START

Other Approval Signatures/Date: \_\_\_\_\_  
Signature

Printed Name/Title:

Document Control Numbering System : \_\_\_\_\_

QAPP Worksheet #2  
(UFP-QAPP Section 2.2.4)  
**QAPP Identifying Information**

**Site Name/Project Name:** Riverside Avenue Site

**Site Location:** Newark, NJ

**Site Number/Code:**

**Operable Unit:** 00

**Contractor Name:** Tetra Tech

**Contractor Number:** EP-S7-06-01

**Contract Title:** START

**Work Assignment Number:** 0115

**Title:** Riverside Avenue Site QAPP

**Revision Number:** 0

**Revision Date:**

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1. Identify regulatory program: CERCLA

2. Identify approval entity: EPA R2

3. The QAPP is (select one): ☐ Generic ☒ Project Specific

4. List dates of scoping sessions that were held: 11/29/2010

5. List dates and titles of QAPP documents written for previous site work, if applicable:

Title	Approval Date
-------	---------------

Riverside Avenue Site QAPP	

6. List organizational partners (stakeholders) and connection with lead organization:

EPA R2

7. List data users:

EPA R2

8. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusions below:

**QAPP Worksheet #2**  
**QAPP Identifying Information**  
**(continued)**

<b>Required QAPP Element(s) and Corresponding QAPP Section(s)</b>	<b>Required Information</b>	<b>Crosswalk to Related Documents</b>
<b>Project Management and Objectives</b>		
2.1 Title and Approval Page	- Title and Approval Page	2
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	3
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	8
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	10
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	14
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria Table	16

**QAPP Worksheet #2**  
**QAPP Identifying Information**  
**(continued)**

<b>Required QAPP Element(s) and Corresponding QAPP Section(s)</b>	<b>Required Information</b>	<b>Crosswalk to Related Documents</b>
2.7 Secondary Data Evaluation	<ul style="list-style-type: none"> <li>- Sources of Secondary Data and Information</li> <li>- Secondary Data Criteria and Limitations Table</li> </ul>	23
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	<ul style="list-style-type: none"> <li>- Summary of Project Tasks</li> <li>- Reference Limits and Evaluation Table</li> <li>- Project Schedule/Timeline Table</li> </ul>	24
<b>Measurement/Data Acquisition</b>		
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures 3.1.2.3 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.4 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	<ul style="list-style-type: none"> <li>- Sampling Design and Rationale</li> <li>- Sample Location Map</li> <li>- Sampling Locations and Methods/SOP Requirements Table</li> <li>- Analytical Methods/SOP Requirements Table</li> <li>- Field Quality Control Sample Summary Table</li> <li>- Sampling SOPs</li> <li>- Project Sampling SOP References Table</li> <li>- Field Equipment Calibration, Maintenance, Testing, and Inspection Table</li> </ul>	43
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	<ul style="list-style-type: none"> <li>- Analytical SOPs</li> <li>- Analytical SOP References Table</li> <li>- Analytical Instrument Calibration Table</li> <li>- Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table</li> </ul>	51



**QAPP Worksheet #2**  
**QAPP Identifying Information**  
**(continued)**

<b>Required QAPP Element(s) and Corresponding QAPP Section(s)</b>	<b>Required Information</b>	<b>Crosswalk to Required Documents</b>
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	<ul style="list-style-type: none"> <li>- Sample Collection Documentation Handling, Tracking, and Custody SOPs</li> <li>- Sample Container Identification</li> <li>- Sample Handling Flow Diagram</li> <li>- Example Chain-of-Custody Form and Seal</li> </ul>	57
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	<ul style="list-style-type: none"> <li>- QC Samples Table</li> <li>- Screening/Confirmatory Analysis Decision Tree</li> </ul>	59
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	<ul style="list-style-type: none"> <li>- Project Documents and Records Table</li> <li>- Analytical Services Table</li> <li>- Data Management SOPs</li> </ul>	80
<b>Assessment/Oversight</b>		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	<ul style="list-style-type: none"> <li>- Assessments and Response Actions</li> <li>- Planned Project Assessments Table</li> <li>- Audit Checklists</li> <li>- Assessment Findings and Corrective Action Responses Table</li> </ul>	82
4.2 QA Management Reports	<ul style="list-style-type: none"> <li>- QA Management Reports Table</li> </ul>	84
4.3 Final Project Report		

**QAPP Worksheet #2**  
**QAPP Identifying Information**  
**(continued)**

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
<b>Data Review</b>		
5.1 Overview		
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process Table - Validation (Steps IIa and IIb) Process Table - Validation (Steps IIa and IIb) Summary Table - Usability Assessment	84
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining		NA

**QAPP Worksheet #3**

(UFP-QAPP Manual Section 2.3.1)

**Distribution List**

<b>QAPP Recipients</b>	<b>Title</b>	<b>Organization</b>	<b>Telephone Number</b>	<b>Fax Number</b>	<b>E-mail Address</b>	<b>Document Control Number</b>
Ildefonso Acosta	Work Assignment Mgr	EPA	201.362.4863		Acosta.ildefonso@epa.gov	

**QAPP Worksheet #4** (UFP-QAPP Manual Section 2.3.2)

**Project Personnel Sign-Off Sheet**

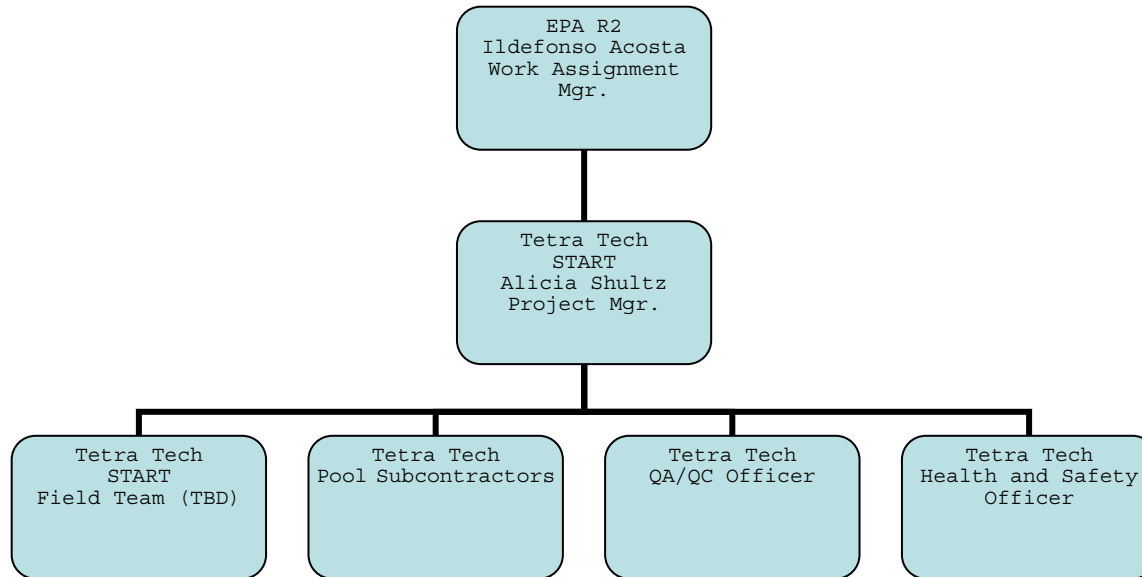
**Organization:** Tetra Tech / START R7 Crossover to R2

<b>Project Personnel</b>	<b>Title</b>	<b>Telephone Number</b>	<b>Signature</b>	<b>Date QAPP Read</b>
Alicia Shultz	Project Manager	518.356.3793		01/24/2011
Kevin Scott	Field Manager	302.283.2248		

**QAPP Worksheet #5**

(UFP-QAPP Manual Section 2.4.1)

**Project Organizational Chart**



**QAPP Worksheet #6**

(UFP-QAPP Manual Section 2.4.2)

**Communication Pathways**

<b><u>Communication Drivers</u></b>	<b><u>Responsible Entity</u></b>	<b><u>Name</u></b>	<b><u>Phone Number</u></b>	<b><u>Procedure (Timing, Pathways, etc.)</u></b>
Approval of initial QAPP and any amendments	EPA Work Assignment Manager EPA QA Coordinator START Project Manager START QA/QC Officer	Ildefonso Acosta Amelia Jackson Alicia Shultz Sara Legard	201.362.4863 732.906.6164 518.356.3793 302.283.2273	START internal peer review, followed by EPA approval, implementation of changes effective only with approved QAPP or QAPP Change Form.
Nonconformance and Corrective Action	START PM EPA WAM START QA/QC Officer	Alicia Shultz Ildefonso Acosta Sara Legard	518.356.3793 201.362.4863 302.283.2273	Use of the Work Assignment Field Change Form for field issues.
Posting of Deliverables to the EPA website	START PM	Alicia Shultz	518. 356.3793	As per work assignment, posting of deliverables to EPA website constitutes delivery to the Work Assignment Manager
Work Assignment	START PM	Alicia Shultz	518.356.3793	Describes scope of work to START personnel from the EPA Work Assignment Manager.
Health and Safety On-Site Meeting	START PM and/or Site Health and Safety Officer	Kevin Scott	302.283-2248	Describe potential site hazards, required personal protective equipments, and access to local emergency services.

**QAPP Worksheet #7**

(UFP-QAPP Manual Section 2.4.3)

**Personnel Responsibilities and Qualification Table**

<b>Name</b>	<b>Title</b>	<b>Organizational Affiliation</b>	<b>Responsibilities</b>	<b>Education and Experience Qualifications</b>
Alicia Shultz	Project Manager	START	Project Supervision/Site Health and Safety Officer/Sampling Operations	Minimum B.S. degree plus 8 years of related experience
Kevin Scott	Field Team Leader	START	Supervise field team during field activities	Minimum B.S. degree plus 8 years of related experience
Josh Cope	Senior Chemist	START	Analytical Section Oversight/Data Validation	Minimum B.S. degree plus 5 years of related experience
Joseph Gawarzewski	Environmental Scientist	START	Sampling Operations	Minimum B.S. degree plus 5 years of related experience
Heather Agpar	Environmental Scientist	START	Sampling Operations	Minimum B.S. degree plus 5 years of related experience
Dave Scerbo	Environmental Scientist	START	Sampling Operations	Minimum B.S. degree plus 5 years of related experience
Sara Legard	QA/QC officer	START	QA and deliverables review	Minimum B.S. degree plus 5 years of related experience
Ildefonso Acosta	Work Assignment Mgr.	EPA	Technical Direction	EPA job-related qualifications/EPA files

**QAPP Worksheet #8**

(UFP-QAPP Manual Section 2.4.4)

**Special Personnel Training Requirements Table**

<b>Project Function</b>	<b>Specialized Training – Title or Description of Course</b>	<b>Training Provider</b>	<b>Training Date</b>	<b>Personnel/Groups Receiving Training</b>	<b>Personnel Titles/ Organizational Affiliation</b>	<b><u><a href="#">Location of Training Records/Certificates</a></u></b>
Project Oversight	Project Manager	START	2006	Alicia Shultz	Project manager/START	Quality files
Project oversight	Health and Safety 8-hour refresher	START	2010	Alicia Shultz	Project Manager	Health and Safety files
Sampling Operations	Health and Safety 8-hour refresher	START	2011	Kevin Scott	Env. Scientist/START	Health and Safety files
Sampling Operations	Health and Safety 8-hour refresher	START	2011	Joseph Gawarzewski	Env. Scientist/START	Health and Safety files
Sampling Operations	Health and Safety 8-hour refresher	START	2010	Heather Apgar	Env. Scientist/START	Health and Safety files
Sampling Operations	Health and Safety 8-hour refresher	START	2011	Dave Scerbo	Env. Scientist/START	Health and Safety files
Validation Oversight	Data review and validation	START	2011	Josh Cope	Chemist	Quality files



## QAPP Worksheet #9

(UFP-QAPP Manual Section 2.5.1)

### Project Scoping Session Participants Sheet

<b>Project Name:</b> Riverside Avenue Site <b>Projected Date(s) of Sampling:</b> TBD <b>Project Manager:</b> Alicia Shultz			<b>Site Name:</b> Riverside Avenue Site <b>Site Location:</b> Newark, NJ		
<b>Date of Session:</b> 11/29/2010 (follow up conference call held 1/7/2010) <b>Scoping Session Purpose:</b> site visit and sampling reconnaissance					
Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Alicia Shultz	Project Mgr.	START	518.356.3793	<a href="mailto:Alicia.shultz@tetrattech.com">Alicia.shultz@tetrattech.com</a>	Project Manager
Kevin Scott	Env. Sci.	START	302.283.2248	<a href="mailto:kevin.scott@tetrattech.com">kevin.scott@tetrattech.com</a>	Env. Scientist
Ildefonso Acosta	WAM	EPA R2	212.637.4344	<a href="mailto:Acosta.Ildefonso@epa.gov">Acosta.Ildefonso@epa.gov</a>	EPA WAM
Dwayne Harrington	OSC	EPA R2	732.906.6899	<a href="mailto:Harrington.Dwayne@epa.gov">Harrington.Dwayne@epa.gov</a>	EPA R2 OSC
David Rosoff	OSC	EPA R2	732.906.6879	<a href="mailto:Rosoff.David@epa.gov">Rosoff.David@epa.gov</a>	EPA R2 OSC
Jan Hagiwara	SAM	EPA R2	212.637.4321	<a href="mailto:Hagiwara.Jan@epamail.epa.gov">Hagiwara.Jan@epamail.epa.gov</a>	SAM

**Comments/Decisions:** Collect up to 25 surface soil samples, 25 subsurface soil samples, and 10 shallow groundwater samples from the site to further delineate the nature and extent of contamination and to determine whether past site activities or continued releases are impacting groundwater. Document a release to groundwater and further delineate the plume of groundwater contamination. Collect background surface and subsurface soil, groundwater, and field QC samples. Submit samples to an EPA Contract Laboratory Program (CLP) laboratory for all parameters on the EPA Target Compound List (TCL) including volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), pesticides, and polychlorinated biphenyls (PCB) and the EPA Target Analyte List (TAL) including total metals, mercury, and cyanide.

**Action Items:** Tetra Tech to prepare and submit a sampling and analysis plan to EPA for review and approval.

**Consensus Decisions:** none

## QAPP Worksheet #10

(UFP-QAPP Manual Section 2.5.2)

### **Problem Definition**

The problem to be addressed by the project: The Site is located at 29 Riverside Avenue, in Newark, NJ. The site was the location of a former manufacturer of paints and varnishes. Eleven areas of concern (AOC) were identified during the preliminary assessment. The AOCs identified include: above ground storage tanks and associated piping, drums in buildings, and spill areas. Analytical results of samples collected during multiple site inspections conducted at the site revealed the presence of VOCs, SVOCs, metals, and PCBs. Also, pipe insulation was confirmed to contain asbestos.
The environmental questions being asked: Are VOC, SVOC, metals, and PCBs present on the site and if so, do the contaminant concentrations present a threat to human health or the environment, or exceed action levels established by EPA Region 2 (Refer to Worksheet # 15 for action limits)
Observations from any site reconnaissance reports: Wastes in containers remain on the site. One of the tanks in Building 7 discharged to the adjacent Passaic River.
A synopsis of secondary data or information from site reports: Not applicable
The possible classes of contaminants and the affected matrices: VOC, SVOC, metals, PCBs, ground water, soil
The rationale for inclusion of chemical and nonchemical analyses: Known VOC, SVOC, PCB and metals contamination in groundwater, soil, and contained waste.
Information concerning various environmental indicators: Concentrations of VOCs, SVOCs, metals, and PCB were previously detected in soil, groundwater, and waste samples collected from the site
Project decision conditions ("If..., then..." statements): If contaminant concentrations are detected in samples that exceed EPA risk-based concentrations, then further action at the site will be warranted. (Refer to Worksheet # 15)

## QAPP Worksheet #11

(UFP-QAPP Manual Section 2.6.1)

### Project Quality Objectives / Systematic Planning Process Statements

Who will use the data? EPA Region 2
What will the data be used for? The data will be used by EPA Region 2 to prepare a Hazard Ranking System (HRS) package
What type of data are needed? (target analytes, analytical groups, field screening, off-site laboratory techniques, sampling techniques) Sampling type and matrix: groundwater, soil. Definitive and Screening data Analytical Techniques: Field screening, off-site laboratory analyses Parameters: TCL organics, TAL inorganics Type of sampling equipments: Geoprobe, stainless steel bowls, spoons, and hand augers; bailers, and sample jars Sampling locations: On-site and off-site
How “good” do the data need to be in order to support the environmental decision? Data must meet Hazard Ranking System (HRS) criteria. The CLP program provides the level of analytical data and data validation required by the HRS. Data must meet definitive data requirements. The quantitation levels are specified on Worksheet #15. All definitive laboratory analyses will be performed by a CLP laboratory(s). Worksheet #12 and #28 show the measurement performance criteria that are needed for the quality indicators. Worksheet #20 outlines the quality control (QC) sample requirements. All data analyzed by CLP lab(s) will be validated by the EPA/ESAT contract.
How much data are needed? (number of samples for each analytical group, matrix, and concentration) There will be approximately 50 soil samples collected and 10 groundwater samples
Where, when, and how should the data be collected/generated? Sampling activities will be conducted during the week of <b>TBD</b> . (Refer to Worksheet # 21, Worksheet #22, & Worksheet #23)
Who will collect and generate the data? All samples will be collected by Tetra Tech START personnel and relinquished for analysis to an EPA CLP laboratory for analyses. Monitoring data will be generated by Tetra Tech START personnel.
How will the data be reported? Validated data will be reported in a final analytical report prepared by EPA’s ESAT contractor in accordance with EPA CLP protocol. A draft trip report will be prepared to include both analytical and monitoring data. The final trip report and HRS package will be the final deliverables submitted to the EPA WAM. Data will be disseminated to EPA Region 2 by the WAM.
How will the data be archived? Hard copy will be stored in the Tetra Tech START Central Files and e-copies will be stored on the Tetra Tech START Local Area Network (LAN). Data will be imported into a Scribe database and posted to the EPA website.

## QAPP Worksheet #12 -1

(UFP-QAPP Manual Section 2.6.2)

**Measurement Performance Criteria Table**

<b>Matrix</b>	Water				
<b>Analytical Group</b>	VOA, SVOA, Pest/PCB				
<b>Concentration Level</b>	Medium level				
<b>Sampling Procedure<sup>1</sup></b>	<b>Analytical Method/SOP<sup>2</sup></b>	<b><u>Data Quality Indicators (DQIs)</u></b>	<b><u>Measurement Performance Criteria</u></b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
Tetra Tech SOP 009	CLP SOW SOM01.2	Precision	RPD $\leq$ 25%	Lab duplicates	A
		Accuracy/Bias	$\pm$ 30% recovery	Lab control sample	A
		Sensitivity	$\pm$ 50%	Limit of quantitation	A
		Completeness	> 90 %	Data completeness check	S & A

<sup>1</sup>Reference number from [QAPP Worksheet #21](#) (see Section 3.1.2).

<sup>2</sup>Reference number from [QAPP Worksheet #23](#) (see Section 3.2).

**QAPP Worksheet #12 -2**

(UFP-QAPP Manual Section 2.6.2)

**Measurement Performance Criteria Table**

<b>Matrix</b>	Water				
<b><u>Analytical Group</u></b>	Metals				
<b>Concentration Level</b>	Medium level				
<b>Sampling Procedure<sup>1</sup></b>	<b>Analytical Method/SOP<sup>2</sup></b>	<b><u>Data Quality Indicators (DQIs)</u></b>	<b><u>Measurement Performance Criteria</u></b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
Tetra Tech SOP 009	CLP SOW ILM 05.4 ICP-AES+Hg+CN	Precision	RPD $\leq$ 25%	Lab duplicates	A
		Accuracy/Bias	$\pm$ 30% recovery	Lab control sample	A
		Sensitivity	$\pm$ 50%	Limit of quantitation	A
		Completeness	> 90 %	Data completeness check	S & A

<sup>1</sup>Reference number from [QAPP Worksheet #21](#) (see Section 3.1.2).<sup>2</sup>Reference number from [QAPP Worksheet #23](#) (see Section 3.2).

**QAPP Worksheet #12 -3**  
(UFP-QAPP Manual Section 2.6.2)

**Measurement Performance Criteria Table**

<b>Matrix</b>	Soil				
<b><u>Analytical Group</u></b>	VOA, SVOA, Pest/PCB				
<b>Concentration Level</b>	medium level				
<b>Sampling Procedure<sup>1</sup></b>	<b>Analytical Method/SOP<sup>2</sup></b>	<b><u>Data Quality Indicators (DQIs)</u></b>	<b><u>Measurement Performance Criteria</u></b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
Tetra Tech SOP005	CLP SOW SOM01.2	Precision	RPD ≤25%	Lab duplicates	A
		Accuracy/Bias	± 30% recovery	Lab control sample	A
		Sensitivity	± 50%	Limit of quantitation	A
		Completeness	> 90 %	Data completeness check	S & A

<sup>1</sup>Reference number from [QAPP Worksheet #21](#) (see Section 3.1.2).

<sup>2</sup>Reference number from [QAPP Worksheet #23](#) (see Section 3.2).

**QAPP Worksheet #12 - 4**  
(UFP-QAPP Manual Section 2.6.2)

**Measurement Performance Criteria Table**

<b>Matrix</b>	Soil				
<b><u>Analytical Group</u></b>	Metals				
<b>Concentration Level</b>	medium level				
<b>Sampling Procedure<sup>1</sup></b>	<b>Analytical Method/SOP<sup>2</sup></b>	<b><u>Data Quality Indicators (DQIs)</u></b>	<b><u>Measurement Performance Criteria</u></b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
Tetra Tech SOP005	CLP SOW ILM 05.4 ICP-AES+Hg+CN	Precision	RPD ≤25%	Lab duplicates	A
		Accuracy/Bias	± 30% recovery	Lab control sample	A
		Sensitivity	± 50%	Limit of quantitation	A
		Completeness	> 90 %	Data completeness check	S & A

<sup>1</sup>Reference number from [QAPP Worksheet #21](#) (see Section 3.1.2).

<sup>2</sup>Reference number from [QAPP Worksheet #23](#) (see Section 3.2).

**QAPP Worksheet #13**

(UFP-QAPP Manual Section 2.7)

**Secondary Data Criteria and Limitations Table**

<b><u>Secondary Data</u></b>	<b>Data Source (Originating Organization, Report Title, and Date)</b>	<b>Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)</b>	<b>How Data Will Be Used</b>	<b>Limitations on Data Use</b>
Removal data	EPA Removal data, 2011	EPA Removal data	Characterize waste and delineate soil and groundwater contamination	None, analysis was conducted through CLP.



## QAPP Worksheet #14

(UFP-QAPP Manual Section 2.8.1)

### Summary of Project Tasks

Sampling Tasks: Collect groundwater samples to further delineate the plume of groundwater contamination under the former operational areas of Pittsburgh Paint and Glass (PP&G) at the Riverside Avenue site. Collect soil samples to identify the area of soil contamination associated with former PP&G operations.
Analysis Tasks: analysis of all samples collected during the assessment and submitted to an offsite CLP laboratory will be performed in accordance with EPA Methods specified Worksheet 12 above.
Quality Control Tasks: Collocated field duplicates and trip blanks will be collected and analyzed. Quality control (QC) samples are described in Worksheet #20. All analytical methods will perform initial performance checks (tunes), initial and continuing calibrations, method blanks, laboratory control samples, and all applicable QC defined in the method.
Secondary Data: Screening data collected during field investigation.
Data Management Tasks: All sampling locations will be identified by a field assigned number. Field sampling data will be recorded on field data sheets or in field books. All samples will be delivered under chain of custody (COC) to the specified laboratory. Laboratory procedures will be reviewed and the data verified for the appropriate quality assurance objectives. All monitoring locations will be identified by a field assigned number. All monitoring data will be recorded in the field logbook or field data sheets. All monitoring data will be peer reviewed and the data verified for the appropriate quality assurance objectives. All deliverables will be generated in accordance to the appropriate Tetra Tech START SOP and posted to the EPA website upon completion. Posting to the EPA website will be considered as completion of the deliverable.
Documentation and Records: The Tetra Tech START Program QAPP serves as the basis for this site-specific QAPP. The most current approved version is available to all Tetra Tech START technical personnel as an uncontrolled copy on the Tetra Tech LAN. All documentation will be recorded in accordance with Tetra Tech SOP #24, <i>Recording of Notes in Field Logbook</i> and SOP #19, <i>Packaging and Shipping Samples</i> . The Final Report will provide a description of the project; field and laboratory methodologies and results. Documents and records that may be generated during this project include: Sampling and Analysis Plan, QAPP, Health and Safety (HASP), Field Logbooks, Site Maps, Sample Labels, COC Records, Custody Seals, Instrument Printouts, Analytical Reports, Scribe Database, Final Report, and CLP Analytical Reports.
Assessment/Audit Tasks: No performance audit of field operations is anticipated for this project. The tasks associated with this QAPP are assessed using peer reviews and management system reviews. Peer review enables the chemist to identify and correct reporting errors before reports are submitted. Management system reviews establish compliance with prevailing management structure, policies and procedures, and ensures that the required data are obtained.
Data Review Tasks: All project deliverables will receive an internal 3-tier review to include: technical, editorial, and QC review prior to release, per guidelines established in the Tetra Tech QMP.

**QAPP Worksheet #15**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Soil  
**Analytical Group:** Target Compound List Volatile Organic Compounds  
**Concentration Level:** Low and Medium

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
1,1,1-Trichloroethane	71-55-6	2000000.0	0.25	0.005	0.25
1,1,2,2-Tetrachloroethane	630-20-6	31000.0	0.25	0.005	0.25
1,1,2,2-Tetrachloroethane	79-34-5	--	0.25	0.005	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	31000000.0	0.25	0.005	0.25
1,1,2-Trichloroethane	79-00-5	4100.0	0.25	0.005	0.25
1,1-Dichloroethane	75-34-3	200000.0	0.25	0.005	0.25
1,1-Dichloroethene	75-35-4	51000.0	0.25	0.005	0.25
1,2,3-Trichlorobenzene	87-61-6	820.0	0.25	0.005	0.25
1,2,4-Trichlorobenzene	120-82-1	10000.0	0.25	0.005	0.25
1,2-Dibromo-3-chloropropane	96-12-8	200.0	0.25	0.005	0.25
1,2-Dibromoethane	106-93-4	9200.0	0.25	0.005	0.25
1,2-Dichlorobenzene	95-50-1	92000.0	0.25	0.005	0.25
1,2-Dichloroethane	107-06-2	20000.0	0.25	0.005	0.25
1,2-Dichloropropane	78-87-5	92000.0	0.25	0.005	0.25
1,3-Dichlorobenzene	541-73-1	--	0.25	0.005	0.25
1,4-Dichlorobenzene	106-46-7	72000.0	0.25	0.005	0.25
1,4-Dioxane	123-91-1	31000.0	0.5	0.01	0.5
2-Butanone	78-93-3	610000.0	0.5	0.01	0.5
2-Hexanone	591-78-6	--	0.5	0.01	0.5
4-Methyl-2-Pentanone	108-10-1	82000.0	0.5	0.01	0.5
Acetone	67-64-1	920000.0	0.5	0.01	0.5
Benzene	71-43-2	4100.0	0.25	0.005	0.25
Bromodichloromethane	75-27-4	20000.0	0.25	0.005	0.25
Bromoform	75-25-2	20000.0	0.25	0.005	0.25
Bromomethane	74-83-9	1400.0	0.25	0.005	0.25
Carbon disulfide	75-15-0	100000.0	0.25	0.005	0.25
Carbon Tetrachloride	56-23-5	4100.0	0.25	0.005	0.25
Chlorobenzene	108-90-7	20000.0	0.25	0.005	0.25
Chloroethane	75-00-3	--	0.25	0.005	0.25
Chloroform	67-66-3	10000.0	0.25	0.005	0.25

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010

**QAPP Worksheet #15****(cont.)****Matrix:** Soil**Analytical Group:** Target Compound List Volatile Organic Compounds - Continued**Concentration Level:** Low and Medium

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
Chloromethane	74-87-3	--	0.25	0.005	0.25
cis-1,2-Dichloroethene	156-59-2	2000.0	0.25	0.005	0.25
cis-1,3-Dichloropropene	10061-01-5	--	0.25	0.005	0.25
Cyclohexane	110-82-7	--	0.25	0.005	0.25
<u>Dibromochloromethane</u>	124-48-1	20000.0	0.25	0.005	0.25
Dichlorodifluoromethane	75-71-8	200000.0	0.25	0.005	0.25
Ethylbenzene	100-41-4	100000.0	0.25	0.005	0.25
Isopropylbenzene	98-82-8	--	0.25	0.005	0.25
<u>m,p-Xylene</u>	1330-20-7	200000.0	0.25	0.005	0.25
Methyl Acetate	79-20-9	1000000.0	0.25	0.005	0.25
Methyl tert-Butyl Ether	1634-04-4	--	0.25	0.005	0.25
Methylcyclohexane	108-87-2	--	0.25	0.005	0.25
Methylene Chloride	75-09-2	61000.0	0.25	0.005	0.25
<u>o-Xylene</u>	95-47-6	200000.0	0.25	0.005	0.25
Styrene	100-42-5	200000.0	0.25	0.005	0.25
Tetrachloroethene	127-18-4	--	0.25	0.005	0.25
Toluene	108-88-3	82000.0	0.25	0.005	0.25
trans-1,2-Dichloroethene	156-60-5	20000.0	0.25	0.005	0.25
trans-1,3-Dichloropropene	10061-02-6	--	0.25	0.005	0.25
Trichloroethene	79-01-6	--	0.25	0.005	0.25
Trichlorofluoromethane	75-69-4	310000.0	0.25	0.005	0.25
Vinyl chloride	75-01-4	3100.0	0.25	0.005	0.25
Xylenes (total)	1330-20-7	--	0.25	0.005	0.25

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Soil

**Analytical Group:** Target Compound List – Semi-Volatile Organic Compounds

**Concentration Level:** Low and Medium

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
1,1'-Biphenyl	92-52-4	--	5	0.17	5
1,2,4,5-Tetrachlorobenzene	95-94-3	310.0	5	0.17	5
2,2'-oxybis(1-Chloropropane)	108-60-1	--	5	0.17	5
2,3,4,6-Tetrachlorophenol	58-90-2	31000.0	5	0.17	5
2,4,5-Trichlorophenol	92-52-4	51000.0	5	0.17	5
2,4,6-Trichlorophenol	88-06-2	--	5	0.17	5
2,4-Dichlorophenol	120-83-2	--	5	0.17	5
2,4-Dimethylphenol	105-67-9	20000.0	5	0.17	5
2,4-Dinitrophenol	51-28-5	--	10	0.33	10
2,4-Dinitrotoluene	121-14-2	2000.0	5	0.17	5
2,6-Dinitrotoluene	606-20-2	1000.0	5	0.17	5
2-Chloronaphthalene	91-58-7	--	5	0.17	5
2-Chlorophenol	95-57-8	--	5	0.17	5
2-Methylnaphthalene	91-57-6	--	5	0.17	5
2-Methylphenol (o-cresol)	95-48-7	--	5	0.17	5
2-Nitroaniline	88-74-4	10000.0	10	0.33	10
2-Nitrophenol	88-75-5	--	5	0.17	5
3,3'-Dichlorobenzidine	91-94-1	--	5	0.17	5
3-Nitroaniline	99-09-2	--	10	0.33	10
4,6-Dinitro-2-methylphenol	534-52-1	--	10	0.33	10
4-Bromophenyl-phenylether	101-55-3	--	5	0.17	5
4-Chloro-3-methylphenol	59-50-7	--	5	0.17	5
4-Chloroaniline	106-47-8	--	5	0.17	5
4-Chlorophenyl-phenyl ether	7005-72-3	--	5	0.17	5
4-Methylphenol (p-cresol)	106-44-5	--	5	0.17	5
4-Nitroaniline	100-01-6	4100.0	10	0.33	10
4-Nitrophenol	100-02-7	--	10	0.33	10
Acenaphthene	83-32-9	61000.0	5	0.17	5

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Soil**Analytical Group:** Target Compound List – Semi-Volatile Organic Compounds - Continued**Concentration Level:** Low and Medium

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
Acenaphthylene	208-96-8	--	5	0.17	5
Acetophenone	98-86-2	100000.0	5	0.17	5
Anthracene	120-12-7	310000.0	5	0.17	5
Atrazine	1912-24-9	--	5	0.17	5
Benzaldehyde	100-52-7	100000.0	5	0.17	5
Benzo(a)anthracene	56-55-3	--	5	0.17	5
Benzo(a)pyrene	50-32-8	--	5	0.17	5
Benzo(b)fluoranthene	205-99-2	--	5	0.17	5
Benzo(g,h,i)perylene	191-24-2	--	5	0.17	5
Benzo(k)fluoranthene	207-08-9	--	5	0.17	5
Bis(2-chloroethoxy) methane	111-91-1	3100.0	5	0.17	5
Bis-(2-Chloroethyl) ether	111-44-4	--	5	0.17	5
bis(2-Ethylhexyl)phthalate	117-81-7	--	5	0.17	5
Butylbenzylphthalate	85-68-7	--	5	0.17	5
Caprolactam	105-60-2	510000.0	5	0.17	5
Carbazole	86-74-8	--	5	0.17	5
Chrysene	218-01-9	--	5	0.17	5
Dibenzo(a,h)anthracene	53-70-3	--	5	0.17	5
Dibenzofuran	132-64-9	--	5	0.17	5
Diethylphthalate	84-66-2	--	5	0.17	5
Dimethylphthalate	131-11-3	--	5	0.17	5
Di-n-butylphthalate	84-74-2	--	5	0.17	5
Di-n-octylphthalate	117-84-0	--	5	0.17	5
Fluoranthene	206-44-0	41000.0	5	0.17	5

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Soil**Analytical Group:** Target Compound List – Semi-Volatile Organic Compounds - Continued**Concentration Level:** Low and Medium

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
Fluorene	86-73-7	41000.0	5	0.17	5
Hexachlorobenzene	118-74-1	--	5	0.17	5
Hexachlorobutadiene	87-68-3	--	5	0.17	5
Hexachlorocyclopentadiene	77-47-4	--	5	0.17	5
Hexachloroethane	67-72-1	1000.0	5	0.17	5
Indeno(1,2,3-cd)pyrene	193-39-5	--	5	0.17	5
Isophorone		--	5	0.17	5
Naphthalene	91-20-3	20000.0	5	0.17	5
Nitrobenzene		--	5	0.17	5
N-Nitroso-di-n propylamine	621-64-7	--	5	0.17	5
N-Nitrosodiphenylamine		--	5	0.17	5
Pentachlorophenol		--	10	0.33	10
Phenanthrene		--	5	0.17	5
Phenol		--	5	0.17	5
Pyrene	129-00-0	31000.0	5	0.17	5

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Soil  
**Analytical Group:** Target Compound List Pesticides  
**Concentration Level:** Low

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 Quantitation Limits (mg/kg)
alpha-BHC	319-84-6	8200.0	0.0017	0.0017
beta-BHC	319-85-7	--	0.0017	0.0017
delta-BHC	319-86-8	--	0.0017	0.0017
gamma-BHC (Lindane)	58-89-9	310.0	0.0017	0.0017
Heptachlor	76-44-8	510.0	0.0017	0.0017
Aldrin	309-00-2	--	0.0017	0.0017
Heptachlor epoxide	1024-57-3	13.0	0.0017	0.0017
Endosulfan I	959-98-8	6100.0	0.0017	0.0017
Dieldrin	60-57-1	--	0.0033	0.0033
4,4'-DDE	72-55-9	--	0.0033	0.0033
Endrin	72-20-8	310.0	0.0033	0.0033
Endosulfan II	33213-65-9	--	0.0033	0.0033
4,4'-DDD	72-54-8	--	0.0033	0.0033
Endosulfan sulfate	1031-07-8	--	0.0033	0.0033
4,4'-DDT	50-29-3	510.0	0.0033	0.0033
Methoxychlor	72-43-5	5100.0	0.017	0.017
Endrin ketone	53494-70-5	--	0.0033	0.0033
Endrin aldehyde	7421-93-4	--	0.0033	0.0033
alpha-Chlordane	5103-71-9	--	0.0017	0.0017
gamma-Chlordane	5103-74-2	--	0.0017	0.0017
Toxaphene	8001-35-2	--	0.17	0.17

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Soil  
**Analytical Group:** Target Compound List Aroclors (PCBs)  
**Concentration Level:** Low

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 Quantitation Limits (mg/kg)
Aroclor-1016	12674-11-2	72.0	0.033	0.033
Aroclor-1221	11104-28-2	--	0.033	0.033
Aroclor-1232	11141-16-5	--	0.033	0.033
Aroclor-1242	53469-21-9	--	0.033	0.033
Aroclor-1248	12672-29-6	--	0.033	0.033
Aroclor-1254	11097-69-1	20.0	0.033	0.033
Aroclor-1260	11096-82-5	--	0.033	0.033
Aroclor-1262	37324-23-5	--	0.033	0.033
Aroclor-1268	11100-14-4	--	0.033	0.033

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010



**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Soil  
**Analytical Group:** Target Analyte List Inorganics (Mercury and Cyanide)  
**Concentration Level:** Low

Analyte	CAS Number	Ingestion SL HQ=1 (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 Quantitation Limits (mg/kg)
Aluminium	7429-90-5	1000000.0	20	20
Antimony	7440-36-0	410.0	6	6
Arsenic	7440-38-2	310.0	1	1
Barium	7440-39-3	200000.0	20	20
Beryllium	7440-41-7	2000.0	0.5	0.5
Cadmium	7440-43-9	1000.0	0.5	0.5
Calcium	7440-70-2	--	500	500
Chromium	7440-47-3	--	1	1
Cobalt	7440-48-4	310.0	5	5
Copper	7440-50-8	41000.0	2.5	2.5
Iron	7439-89-6	720000.0	10	10
Lead	7439-92-1	--	1	1
Magnesium	7439-95-4	--	500	500
Manganese	7439-96-5	25000.0	1.5	1.5
Mercury	7439-97-6	160.0	0.1	0.1
Nickel	7440-02-0	--	4	4
Potassium	9/7/7440	--	500	500
Selenium	7782-49-2	5100.0	3.5	3.5
Silver	7440-22-4	5100.0	1	1
Sodium	7440-23-5	--	500	500
Thallium	7440-28-0	--	2.5	2.5
Vanadium	7440-62-2	5200.0	5	5
Zinc	7440-66-6	310000.0	6	6
Cyanide	57-12-5	20000.0	2.5	2.5

\* U. S EPA Regional Screening Level (RSL) Industrial Soil Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:**

Groundwater

**Analytical Group:**

Target Compound List Volatile Organic Compounds

**Concentration Level:**

Trace &amp; Low

Analyte	CAS Number	Risk-based SSL (mg/kg)*	MCL-based SSL (mg/kg)*	MCL (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Trace Quantitation Limits (ug/L)	Analytical Method – SOM01.2 Low Quantitation Limits (ug/L)
1,1,1-Trichloroethane	71-55-6	3.20	0.07	200.00	5	0.5	5
1,1,2,2-Tetrachloroethane	79-34-5	0.000026			5	0.5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	150.00			5	0.5	5
1,1,2-Trichloroethane	79-00-5	0.000078	0.0016	5.00	5	0.5	5
1,1-Dichloroethane	75-34-3	0.00069			5	0.5	5
1,1-Dichloroethene	75-35-4	0.1200	0.0025	7.00	5	0.5	5
1,2,3-Trichlorobenzene	87-61-6	0.09			5	0.5	5
1,2,4-Trichlorobenzene	120-82-1	0.01	0.20	70.00	5	0.5	5
1,2-Dibromo-3-chloropropane	96-12-8	0.00000014	0.000086	0.20	5	0.5	5
1,2-Dibromoethane	106-93-4	0.0000018	0.000014	0.05	0.05	0.5	5
1,2-Dichlorobenzene	95-50-1	0.36	0.58	600.00	5	0.5	5
1,2-Dichloroethane	107-06-2	0.000042	0.0014	5.00	5	0.5	5
1,2-Dichloropropane	78-87-5	0.00013	0.00170	5.00	5	0.5	5
1,3-Dichlorobenzene	541-73-1				5	0.5	5
1,4-Dichlorobenzene	106-46-7	0.00041	0.072	75.00	5	0.5	5
2-Butanone (Methyl Ethyl Ketone)	78-93-3	1.50			10	5	10
2-Hexanone	591-78-6	0.01			10	5	10
4-Methyl-2-Pentanone	108-10-1	0.45			10	5	10
Acetone (2-Propanone)	67-64-1	4.50			10	5	10
Benzene	71-43-2	0.0002	0.0026	5.00	5	0.5	5
Bromochloromethane	74-97-5				5	0.5	5
Bromodichloromethane	75-27-4	0.00	0.02	80.00	5	0.5	5
Bromoform	75-25-2	0.002	0.021	80.00	5	0.5	5
Bromomethane	74-83-9	0.0022			5	0.5	5
Carbon Disulfide	75-15-0	0.31			5	0.5	5
Carbon Tetrachloride	56-23-5	0.0002	0.0019	5.00	5	0.5	5
Chlorobenzene	108-90-7	0.06	0.07	100.00	5	0.5	5
Chloroethane	75-00-3	5.90			5	0.5	5
Chloroform	67-66-3	0.0001	0.0220	80.00	5	0.5	5
Chloromethane (Methyl Chloride)	74-87-3	0.05			5	0.5	5

\* Regional Screening Level (RSL) Soil to Groundwater Supporting Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Groundwater  
**Analytical Group:** Target Compound List Volatile Organic Compounds – Continued  
**Concentration Level:** Trace & Low

Analyte	CAS Number	Risk-based SSL (mg/kg)*	MCL-based SSL (mg/kg)*	MCL (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Trace Quantitation Limits (ug/L)	Analytical Method – SOM01.2 Low Quantitation Limits (ug/L)
cis-1,2-Dichloroethene	156-59-2	0.02	0.02	70.00	5	0.5	5
cis-1,3-Dichloropropene	10061-01-5				5	0.5	5
Cyclohexane	110-82-7	13.00			5	0.5	5
Dibromochloromethane	124-48-1	0.00004	0.02100	80.00	5	0.5	5
Dichlorodifluoromethane	75-71-8	0.61			5	0.5	5
Ethylbenzene	100-41-4	0.0017	0.78	700.00	5	0.5	5
Isopropylbenzene	98-82-8	4.10			5	0.5	5
Methyl Acetate	79-20-9	7.50			5	0.5	5
Methyl tert-Butyl Ether	1634-04-4	0.0028			5	0.5	5
Methylcyclohexane	108-87-2				5	0.5	5
Methylene Chloride	75-09-2	0.0012	0.0013	5.00	5	0.5	5
Styrene	100-42-5	1.80	0.11	100.00	5	0.5	5
Tetrachloroethene	127-18-4	0.00005	0.00230	5.00	5	0.5	5
Toluene	108-88-3	1.60	0.69	1000.00	5	0.5	5
trans-1,2-Dichloroethene	156-60-5				5	0.5	5
trans-1,3-Dichloropropene	10061-02-6				5	0.5	5
Trichloroethene	79-01-6	0.00072	0.0018	5.00	5	0.5	5
Trichlorofluoromethane	75-69-4	0.83			5	0.5	5
Vinyl Chloride	75-01-4	0.0000056	0.00069	2.00	2	0.5	5
Xylenes (total)	1330-20-7	0.20	9.80	10000.00	5	0.5	5

\* Regional Screening Level (RSL) Soil to Groundwater Supporting Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Groundwater**Analytical Group:** Target Compound List - Semi-Volatile Organic Compounds**Concentration Level:** Low

Analyte	CAS Number	Risk-based SSL (mg/kg)*	MCL-based SSL (mg/kg)*	MCL (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
Benzaldehyde	100-52-7				5	5
4-Bromophenyl-phenylether	101-55-3				5	5
Caprolactam	105-60-2				5	5
2,4-Dimethylphenol	105-67-9				5	5
4-Methylphenol	106-44-5				5	5
4-Chloroaniline	106-47-8				5	5
2,2'-oxybis(1-Chloropropane)	108-60-1				5	5
Phenol	108-95-2	6.30			5	5
Bis-(2-Chloroethyl) ether	111-44-4	0.0000031			5	5
Bis(2-Chloroethoxy)methane	111-91-1	0.025			5	5
bis(2-Ethylhexyl)phthalate	117-81-7	1.1	1.40	6.00	5	5
Di-n-octylphthalate	117-84-0				5	5
Hexachlorobenzene	118-74-1	0.00053	0.01	1.00	1	5
Anthracene	120-12-7	360			5	5
2,4-Dichlorophenol	120-83-2	0.13			5	5
2,4-Dinitrotoluene	121-14-2	0.00029			5	5
Pyrene	129-00-0	120.00			5	5
Dimethylphthalate	131-11-3				5	5
Dibenzofuran	132-64-9	0.68			5	5
Atrazine	1912-24-9	0.000	0.0019	3.00	3	5
Benzo(g,h,i)perylene	191-24-2				5	5
Indeno(1,2,3-cd)pyrene	193-39-5	0.12			5	5
Benzo(b)fluoranthene	205-99-2	0.04			5	5
Fluoranthene	206-44-0	160			5	5
Benzo(k)fluoranthene	207-08-9	0.35			5	5
Acenaphthylene	208-96-8				5	5
Chrysene	218-01-9	1.10			5	5
Benzo(a)pyrene	50-32-8	0.004	0.24	0.20	0.2	5
Dibenzo(a,h)anthracene	53-70-3	0.01			5	5
Phenol	108-95-2	6.30			5	5

\* Regional Screening Level (RSL) Soil to Groundwater Supporting Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Groundwater**Analytical Group:** Target Compound List - Semi-Volatile Organic Compounds - Continued**Concentration Level:** Low

Analyte	CAS Number	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)	MCL (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
Benzo(a)anthracene	56-55-3	0.01			5	5
4-Chloro-3-methylphenol	59-50-7	4.30			5	5
2,6-Dinitrotoluene	606-20-2	0.05			5	5
N-Nitroso-di-n-propylamine	621-64-7	0.0000072			5	5
Hexachloroethane	67-72-1	0.0029			5	5
4-Chlorophenyl-phenyl ether	7005-72-3				5	5
Hexachlorocyclopentadiene	77-47-4	0.68	0.16	50.00	5	5
Isophorone	78-59-1	0.02			5	5
Acenaphthene	83-32-9	22.00			5	5
Diethylphthalate	84-66-2	12.00			5	5
Di-n-butylphthalate	84-74-2	9.20			5	5
Phenanthrene	85-01-8				5	5
Butylbenzylphthalate	85-68-7	0.51			5	5
N-Nitrosodiphenylamine	86-30-6	0.08			5	5
Fluorene	86-73-7	27.00			5	5
Hexachlorobutadiene	87-68-3	0.0017			5	5
2,4,6-Trichlorophenol	88-06-2				5	5
2-Nitrophenol	88-75-5	0.32	0.06	7.00	5	5
Naphthalene	91-20-3	0.00047			5	5
2-Methylnaphthalene	91-57-6	0.75			5	5
2-Chloronaphthalene	91-58-7	15.00			5	5
3,3'-Dichlorobenzidine	91-94-1	0.0010			5	5
1,1'-Biphenyl	92-52-4	19.00			5	5
2-Methylphenol	95-48-7	1.50			5	5
2-Chlorophenol	95-57-8	0.15			5	5
1,2,4,5-Tetrachlorobenzene	95-94-3	0.05			5	5
2,4,5-Trichlorophenol	95-95-4	14.00			5	5
Acetophenone	98-86-2	1.10			5	5
Nitrobenzene	98-95-3				5	5
4-Nitroaniline	100-01-6				10	10
4-Nitrophenol	100-02-7				10	10
2,4-Dinitrophenol	51-28-5	0.08			10	10
4,6-Dinitro-2-methylphenol	534-52-1	0.01			10	10
Pentachlorophenol	87-86-5	0.002	0.01	1.00	1	10
2-Nitroaniline	88-74-4	0.15			10	10
3-Nitroaniline	99-09-2				10	10

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Groundwater**Analytical Group:** Target Compound List - Pesticides**Concentration Level:** Low

Analyte	CAS Number	Risk-based SSL (mg/kg)*	MCL-based SSL (mg/kg)*	MCL (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
4,4'-DDD	72-54-8	0.07			0.1	0.1
4,4'-DDE	72-55-9	0.05			0.1	0.1
4,4'-DDT	50-29-3				0.1	0.1
Aldrin	309-00-2	0.00065			0.05	0.05
alpha-BHC	319-84-6	0.000062			0.05	0.05
alpha-Chlordane	5103-71-9				0.05	0.05
beta-BHC	319-85-7	0.00022			0.05	0.05
delta-BHC	319-86-8				0.05	0.05
Dieldrin	60-57-1	0.0002			0.1	0.1
Endosulfan I	959-98-8				0.05	0.05
Endosulfan II	33213-65-9				0.1	0.1
Endosulfan sulfate	1031-07-8				0.1	0.1
Endrin	72-20-8	0.44	0.08		0.1	0.1
Endrin aldehyde	7421-93-4				0.1	0.1
Endrin ketone	53494-70-5				0.1	0.1
gamma-BHC (Lindane)	58-89-9	0.00036	0.0012	0.20	0.05	0.05
gamma-Chlordane	5103-74-2				0.05	0.05
Heptachlor	76-44-8	0.0012	0.03		0.05	0.05
Heptachlor epoxide	1024-57-3	0.00015	0.0041	0.20	0.05	0.05
Methoxychlor	72-43-5	9.90	2.20		0.5	0.5
Toxaphene	8001-35-2	0.01	0.46		5	5

\* Regional Screening Level (RSL) Soil to Groundwater Supporting Table November 2010

**QAPP Worksheet #15****(cont.)**

(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Groundwater**Analytical Group:** Target Compound List Aroclors (PCBs)**Concentration Level:** Low

Analyte	CAS Number	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)	MCL (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
Aroclor-1016	12674-11-2	0.092			1	1
Aroclor-1221	11104-28-2	0.00012			1	1
Aroclor-1232	11141-16-5	0.00012			1	1
Aroclor-1242	53469-21-9	0.0053			1	1
Aroclor-1248	12672-29-6	0.0052			1	1
Aroclor-1254	11097-69-1	0.009			1	1
Aroclor-1260	11096-82-5	0.024			1	1
Aroclor-1262	37324-23-5				1	1
Aroclor-1268	11100-14-4				1	1

**QAPP Worksheet #15** (cont.)  
(UFP-QAPP Manual Section 2.8.1)

**Matrix:** Groundwater  
**Analytical Group:** Target Analyte List Inorganics (metals and cyanide)  
**Concentration Level:** Low – ICP-AES and ICP-MS

Analyte	CAS Number	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)	MCL (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – ILMO5.4 ICP-AES Quantitation Limits (ug/L)	Analytical Method – ILMO5.4 ICP-MS Quantitation Limits (ug/L)
Aluminum	7429-90-5	55000.00			200	200	--
Antimony	7440-36-0	0.66	0.27	6.00	2	60	2
Arsenic	7440-38-2	0.00	0.29	10.00	1	10	1
Barium	7440-39-3	300.00	82.00	2000.00	200	200	10
Beryllium	7440-41-7	58.00	3.20	4.00	1	5	1
Cadmium	7440-43-9	1.40	0.38		5	5	1
Calcium	7440-70-2				5000	5000	--
Chromium	7440-47-3		180000.00	100.00	10	10	2
Cobalt	7440-48-4	0.49			50	50	1
Copper	7440-50-8	51.00	46.00	1300.00	25	25	2
Iron	7439-89-6	640.00			100	100	--
Lead	7439-92-1		14.00	15.00	10	10	1
Magnesium	7439-95-4				5000	5000	--
Manganese	7439-96-5	57.00			15	15	1
Mercury	7439-97-6	0.03	0.10	2.00	.2	0.2	--
Nickel	7440-02-0	48.00			40	40	1
Potassium	2023695				5000	5000	--
Selenium	7782-49-2	0.95	0.26	50.00	35	35	5
Silver	7440-22-4	1.60			10	10	1
Sodium	7440-23-5				5000	5000	--
Thallium	7440-28-0		0.14	2.00	1	25	1
Vanadium	7440-62-2	2.60			50	50	5
Zinc	7440-66-6	680.00			60	60	2
Cyanide	57-12-5	7.40	2.00	200.00	10	10	--



**QAPP Worksheet #16**

(UFP-QAPP Manual Section 2.8.2)

**Project Schedule Timeline Table**

<b>Activities</b>	<b>Organization</b>	<b>Dates (MM/DD/YY)</b>		<b>Deliverable</b>	<b>Deliverable Due Date</b>
		<b>Anticipated Date(s) of Initiation</b>	<b>Anticipated Date of Completion</b>		
Preparation of SAP	Tetra Tech	1/10/2011	1/19/2011	Yes/SAP	01/20/2011
Preparation of QAPP (attachment to SAP)	Tetra Tech	1/10/2011	1/19/2011	Yes/ with SAP	01/20/2011
Review of QAPP	TBD	Prior to sampling date	TBD	No	TBD
Procurement of Field Equipment	TBD	Prior to sampling date	TBD	No	N/A
Laboratory Request	TBD	Prior to sampling date	TBD	Analytical/CLP Request Form	TBD
Multi-media Sampling	Tetra Tech	TBD	TBD	No	N/A
Preliminary Laboratory Results	TBD	TBD	TBD	Email/Fax Draft results	TBD
Laboratory Package Received	TBD	TBD	TBD	Unvalidated data package	TBD
Validation of Laboratory Results	TBD	TBD	TBD	Validated data Packages	TBD
Data Evaluation/ Preparation of Final Report	TBD	TBD	TBD	Yes/Final Rpt	TBD

**QAPP Worksheet #17**  
(UFP-QAPP Section 3.1.1)

**Sampling Design and Rationale**

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach): EPA Region 2 and EPA contractor personnel determine what samples to collect based historical data and prior site reconnaissance visits.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be collected, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details]:

Collect groundwater samples to delineate the plume of groundwater contamination under the former operational areas of PP&G. Collect soil samples to identify the area of soil contamination associated with former PP&G operations. Document groundwater and surface and subsurface soil background concentrations. Document background concentrations of the historical fill used to fill the portion of the site adjacent to the Passaic River. Attribute hazardous substances detected in the soil and groundwater samples to wastes remaining at the site from PP&G and former PP&G operations. Use the analytical data from the analysis of groundwater and soil samples to prepare a HRS documentation record for Riverside Avenue

**QAPP Worksheet #18**

(UFP-QAPP Manual Section 3.1.1)

**Sampling Locations and Methods/SOP Requirements Table**

<b>Sampling Location/ID Number</b>	<b>Matrix</b>	<b>Depth (inches)</b>	<b>Analytical Group</b>	<b>Concentration Level</b>	<b>Number of Samples (identify field duplicates)</b>	<b>Sampling SOP Reference<sup>1</sup></b>	<b>Rationale for Sampling Location</b>
Background, outside the influence of Riverside Avenue. Exact location to be identified during sampling investigation (see Figures 4 and 5 in SAP). RA-SS-XX to RA-SS-XX	Surface Soil	0 to 6 inches bgs	VOA, SVOA, Pest/PCB, metals, cyanide	Medium	4	SOP005	Background surface soil samples for comparison to on-site soil sample results
On-site (See Figure 4 in SAP).	Surface Soil	0 to 6 inches bgs	VOA, SVOA, Pest/PCB, metals, cyanide	Medium	22	SOP005	Determine presence of hazardous substances
Background, outside the influence of Riverside Avenue. Exact location to be identified during sampling investigation (see Figure 4 and 5 in SAP). / RA-SB-XX-YY to RA-SB-XX-YY	Subsurface Soil	TBD	VOA, SVOA, Pest/PCB, metals, cyanide	Medium	4	SOP005	Background surface soil sample for comparison to soil sample results
On-site (See Figure 4 in SAP).	Subsurface Soil	TBD	VOA, SVOA, Pest/PCB, metals, cyanide	Medium	22	SOP005	Determine presence of hazardous substances
Background temporary well locations to be collected from upgradient location to be determined in the field. The background temporary well locations will be the same location as the background soil boring location (see Figures 4 and 5 in SAP).	Groundwater	TBD	VOA, SVOA, Pest/PCB, metals, cyanide	Medium	4	SOP010	Background ground water sample for comparison to downgradient ground water sample results
Downgradient temporary well locations as shown on Figures 4 and 5 of SAP.	Groundwater	TBD	VOA, SVOA, Pest/PCB, metals, cyanide	Medium	6	SOP010	Determine whether past site activities or continued releases are impacting groundwater. Document a release to groundwater and delineate a groundwater plume

<sup>1</sup>Specify the appropriate reference letter or number from the Analytical SOP References table ([Worksheet #21](#)).

**QAPP Worksheet #19 Analytical SOP Requirements Table**  
(UFP-QAPP Manual Section 3.1.1)

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Soil	50	TCL Volatile Organic Compounds [CLP]	Low/Medium	<a href="#">SOM01.2</a>	15 grams	(3) EnCore Samplers or (2) 4-oz glass jar with septa lid	Cool to 4°C	48 hours (from time of sample collection)
	50	TCL Semi-Volatile Organic Compounds [CLP]	Low/Medium	<a href="#">SOM01.2</a>	100 grams	(1) 8 oz. glass jar w/Teflon lined cap	Cool to 4°C	14 days extract; 40 days analyze
	50	TCL Pesticide Compounds [CLP]	Low/Medium	<a href="#">SOM01.2</a>	100 grams	(1) 8 oz. glass jar w/Teflon lined cap	Cool to 4°C	14 days extract; 40 days analyze
	50	TCL PCB Compounds [CLP ]	Low/Medium	<a href="#">SOM01.2</a>	100 grams	Included with Pesticides	Cool to 4°C	14 days extract; 40 days analyze
	50	TAL Metals+ Hg [CLP]	Low/Medium	<a href="#">ILM05.4</a>	250 grams	(1) 8 oz. glass jar w/Teflon lined cap	Cool to 4°C	180 days (Hg-28 days)
	50	Cyanide	Low/Medium	<a href="#">ILM05.4</a>	250 grams	Included with TAL Metals	Cool to 4°C	14 days

<sup>1</sup>Specify the appropriate reference letter or number from the Analytical SOP References table ([Worksheet #23](#) ).

**QAPP Worksheet #19 Analytical SOP Requirements Table (cont.)**  
 (UFP-QAPP Manual Section 3.1.1)

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/analysis)
Aqueous	10	Low Concentration Volatile Organics [CLP]	Trace or Low	<a href="#">SOM01.2</a>	120 ml	(3) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days; 7 days, if not preserved
	10	Semi-Volatile Organics [CLP]	Low	<a href="#">SOM01.2</a>	1000 ml	(2) 1L amber glass bottles w/Teflon lined cap	Cool to 4°C	7 days extract, 40 days analyze
	10	Pesticide Compounds [CLP]	Low	<a href="#">SOM01.2</a>	1000 ml	(2) 1L amber glass bottle w/Teflon lined cap	Cool to 4°C	7 days extract, 40 days analyze
	10	PCB Compounds [CLP]	Low	<a href="#">SOM01.2</a>	1000 ml	Included with pesticides	Cool to 4°C	7 days extract, 40 days analyze
	10	TAL Metals+ Hg [CLP]	Low	<a href="#">ILM05.4</a>	250 ml	(1) 1 L HDPE	HNO <sub>3</sub> to pH<2; cool to 4°C	6 months (Hg-28 days)
	10	Cyanide	Low	<a href="#">ILM05.4</a>	250 ml	(1) 1 L HDPE	NaOH to pH>12; cool to 4°C	14 days
Trip Blanks		Low Concentration Volatile Organics [CLP / DESA]	Low	<a href="#">SOM01.2</a>	120 ml	(4) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	10 days

**QAPP Worksheet #20**

(UFP-QAPP Manual Section 3.1.1)

**Field Quality Control Sample Summary Table**

<b>Matrix</b>	<b>Analytical Group</b>	<b>Concentration Level</b>	<b>Analytical and Preparation SOP Reference<sup>1</sup></b>	<b><u>No. of Sampling Locations</u></b>	<b><u>No. of Field Duplicate Pairs</u></b>	<b><u>Org./ Inorg. No. of MS</u></b>	<b><u>No. of Field Blanks</u></b>	<b><u>No. of Equip. Blanks</u></b>	<b><u>No. of PT Samples</u></b>	<b>Total No. of Samples to Lab</b>
Soil	TCL VOA, SVOA, Pest/PCB	Low/medium	SOM01.2	2	1/20 samples/matrix	1/20 samples/matrix		As per equipment type	As required	3
Soil	TAL metals	Low/medium	ILM05.4	2	1/20 samples/matrix	1/20 samples/matrix		As per equipment type	As required	3
Aqueous	TCL VOA, SVOA, Pest/PCB	Low/medium	SOM01.2	2	1/20 samples/matrix	1/20 samples/matrix		As per equipment type	As required	3
Aqueous	TAL metals	Low/medium	ILM05.4	2	1/20 samples/matrix	1/20 samples/matrix		As per equipment type	As required	3

<sup>1</sup>Specify the appropriate reference letter or number from the Analytical SOP References table ([Worksheet #23](#) ).

**QAPP Worksheet #21**

(UFP-QAPP Manual Section 3.1.2)

**Project Sampling SOP References Table**

<b>Reference Number</b>	<b>Title, Revision Date and/or Number</b>	<b>Originating Organization</b>	<b>Equipment Type</b>	<b>Modified for Project Work? (Check if yes)</b>	<b>Comments</b>
SOP No. 005	Soil Sampling	Tetra Tech EM Inc.	Hand auger, bucket auger, core sampler, spatula, trowel, FID, PID	<input type="checkbox"/>	
SOP No. 019	Packaging and shipping samples	Tetra Tech EM Inc.	N/A		
SOP No. 024	Recording of Notes in Field Logbooks	Tetra Tech EM Inc.	N/A		
SOP No. 010	Groundwater Sampling	Tetra Tech EM Inc.	Bailer, water level indicator, PID, pump		
SOP No. 002	General equipment decontamination	Tetra Tech EM Inc.	Non-phosphate Detergent, Tap Water. Distilled/Deionized Water, 10% Nitric Acid, Solvent Rinse (Pesticide Grade)		
SOP No. 054	Using the Geoprobe System	Tetra Tech EM Inc.	Geoprobe	<input type="checkbox"/>	

N/A=Not Applicable

**QAPP Worksheet #22 Field Equipment Calibration, Maintenance, Testing, and Inspection Table**  
(UFP-QAPP Manual Section 3.1.2.4)

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
<a href="#">MultiRAE Plus Multiple Gases</a>	Calibrate with Zero Air; span gas of 58% LEL 15% O <sub>2</sub> 10 ppm H <sub>2</sub> S CH <sub>4</sub>	Check/ replace battery/ Clean tip or bulb if necessary	Bump Test	Prior to day's activities; anytime anomaly suspected	LEL 52% - 64% (5%) O <sub>2</sub> 13% - 17% (5%) H <sub>2</sub> S 9 - 12 ppm (1ppm) CH <sub>4</sub> NA	Replace battery or Replace Unit	Equipment Vendor	NA
<a href="#">Universal Sampler Pump</a>	Connect to Bios DryCal DC-Lite Primary Flow Meter	Battery Check	NA	Prior to day's activities; anytime anomaly suspected	NA	Replace batteries or pump if not working properly	Equipment Vendor	NA



**QAPP Worksheet #23**

(UFP-QAPP Manual Section 3.2.1)

**Analytical SOP References Table**

<b>Reference Number</b>	<b>Title, Revision Date, and/or Number</b>	<b><u>Definitive or Screening Data</u></b>	<b>Analytical Group</b>	<b>Instrument</b>	<b>Organization Performing Analysis</b>	<b>Modified for Project Work?</b>
<a href="#">SOM01.2</a>	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis,; October 2006	Definitive	Target Compound List Volatile Organics	GC/MS	CLP RAS Laboratory	<input type="checkbox"/>
<a href="#">SOM01.2</a>	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis,; October 2006	Definitive	Target Compound List Semi-Volatile Organics	GC/MS	CLP RAS Laboratory	
<a href="#">SOM01.2</a>	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis,; October 2006	Definitive	Target Compound List Pesticides	GC/ECD	CLP RAS Laboratory	
<a href="#">SOM01.2</a>	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis,; October 2006	Definitive	Target Compound List PCBs	GC/ECD	CLP RAS Laboratory	
<a href="#">ILM05.4</a>	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Inorganic Analysis,; December 2006	Definitive	Target Analyte List Metals	ICP-AES / ICP-MS	CLP RAS Laboratory	
1311		Definitive	TCLP		CLP lab	

**QAPP Worksheet #24**

(UFP-QAPP Manual Section 3.2.2)

**Analytical Instrument Calibration Table**

<b>Instrument</b>	<b>Calibration Procedure</b>	<b>Frequency of Calibration</b>	<b>Acceptance Criteria</b>	<b>Corrective Action (CA)</b>	<b>Person Responsible for CA</b>	<b>SOP Reference<sup>1</sup></b>
GC/MS	See SOM01.2	Initial calibration: upon award of the contract, whenever the laboratory takes corrective action which may change or affect the initial calibration criteria (e.g., ion source cleaning or repair, column replacement, etc.), or if the continuing calibration acceptance criteria have not been met. Continuing calibration: Once every 12 hours	Initial calibration/ Continuing calibration: relative response factor (RRF) greater than or equal to minimum acceptable response factor listed in Table 5 of procedure; %RSD must be less than or equal to value listed in Table 5 of procedure.	Initial calibration: inspect system for problems (e.g., clean ion source, change the column, service the purge and trap device), correct problem, re-calibrate. Continuing calibration: inspect system, recalibrate the instrument, and reanalyze samples.	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
GC/ECD	See SOM01.2	Initial calibration: upon award of the contract, whenever major instrument maintenance or modification is performed or if the calibration verification technical acceptance criteria have not been met. Calibration verification: Once every 12 hours	Initial calibration/ Calibration verification: resolution between two adjacent peaks must be greater than or equal to 60.0 percent, single components must be greater than or equal to 90.0 percent resolved, RTs within the RT window, %D must be greater than or equal to -25 percent and less than or equal to 25 percent, %RSD must be less than or equal to 20.0 percent.	Initial calibration: inspect the system (e.g., change the column, bake out the detector, clean the injection port), correct problem, re-calibrate. Calibration verification: inspect system, recalibrate the instrument, and reanalyze samples.	EPA CLP RAS Laboratory GC/ECD Technician	SOM01.2

<sup>1</sup>Specify the appropriate reference letter or number from the Analytical SOP References table ([Worksheet #23](#)).

**QAPP Worksheet #24 (cont.)**  
 (UFP-QAPP Manual Section 3.2.2)

**Analytical Instrument Calibration Table**

<b>Instrument</b>	<b>Calibration Procedure</b>	<b>Frequency of Calibration</b>	<b>Acceptance Criteria</b>	<b>Corrective Action (CA)</b>	<b>Person Responsible for CA</b>	<b>SOP Reference<sup>1</sup></b>
ICP-AES / ICP-MS	See ILM05.4; as per instrument manufacturer's recommended procedures	ICP-AES or ICP-MS Initial calibration: daily or once every 24 hours and each time the instrument is set up. ICP-AES or ICP-MS Continuing calibration: beginning and end of run and frequency of 10% or every 2 hours during an analysis run.	ICP-AES: As per instrument manufacturer's recommended procedures, with at least 2 standards. ICP-MS: As per instrument manufacturer's recommended procedures, with at least 2 standards. A minimum of three replicate integrations are required for data acquisition.	ICP-AES or ICP-MS: inspect the system, correct problem, re-calibrate, and re-analyze samples.	EPA CLP RAS Laboratory ICP-AES / ICP-MS Technician	ILM05.4

## QAPP Worksheet #25

(UFP-QAPP Manual Section 3.2.3)

**Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table**

<b>Instrument/ Equipment</b>	<b>Maintenance Activity</b>	<b>Testing Activity</b>	<b>Inspection Activity</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>	<b>Corrective Action</b>	<b>Responsible Person</b>	<b>SOP Reference<sup>1</sup></b>
GC/MS	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	Acceptable re-calibration; see SOM01.2	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
GC/ECD	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	Acceptable re-calibration; see SOM01.2	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory GC/ECD Technician	SOM01.2
ICP-AES / ICP-MS	As per instrument manufacturer's recommendations	As per instrument manufacturer's recommendations ; check connections	As per instrument manufacturer's recommendations ; check connections	As per instrument manufacturer's recommendations	Acceptable re-calibration; see ILM05.4	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory ICP-AES / ICP-MS Technician	ILM05.4

<sup>1</sup>Specify the appropriate reference letter or number from Analytical SOP References table ([Worksheet #23](#) ).

**QAPP Worksheet #26**

(UFP-QAPP Manual Appendix A)

**Sample Handling System**

<b>SAMPLE COLLECTION, PACKAGING, AND SHIPMENT</b>
Sample Collection (Personnel/Organization): Kevin Scott/Tetra Tech
Sample Packaging (Personnel/Organization): Kevin Scott/Tetra Tech
Coordination of Shipment (Personnel/Organization): Kevin Scott/Tetra Tech
Type of Shipment/Carrier: Federal Express
<b>SAMPLE RECEIPT AND ANALYSIS</b>
Sample Receipt (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory//National Non-RAS Laboratory
Sample Custody and Storage (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory//National Non-RAS Laboratory
Sample Preparation (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory//National Non-RAS Laboratory
Sample Determinative Analysis (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory//National Non-RAS Laboratory
<b>SAMPLE ARCHIVING</b>
Field Sample Storage (No. of days from sample collection): Samples to be shipped within 5 days of collection and arrive at laboratory within 24 hours (1 day) of sample shipment
Sample Extract/Digestate Storage (No. of days from extraction/digestion): As per analytical methodology; see Worksheet #19
Biological Sample Storage (No. of days from sample collection): N/A
<b>SAMPLE DISPOSAL</b>
Personnel/Organization: Sample Technicians, EPA CLP RAS Laboratory/ National Non-RAS Laboratory
Number of Days from Analysis: Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

## QAPP Worksheet #27

(UFP-QAPP Manual Section 3.3.3)

### Sample Custody Requirements

**Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):** Each sample will be individually identified and labeled after collection, enclosed in a plastic cooler, and then sealed with custody seals. The sample information will be recorded on chain-of custody (COC) forms, and the samples shipped to the appropriate laboratory via overnight delivery service or courier. Chain-of-custody records must be prepared in Scribe or FORMS II Lite to accompany samples from the time of collection and throughout the shipping process. Each individual in possession of the samples must sign and date the sample COC Record. The chain-of-custody record will be considered completed upon receipt at the laboratory. A traffic report and chain-of-custody record will be maintained from the time the sample is collected to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. Specific information regarding custody of the samples projected to be collected on the weekend will be noted in the field logbook. The chain-of-custody record should include (at minimum) the following: 1) Sample identification number; 2) Sample information; 3) Sample location; 4) Sample date; 5) Sample Time; 6) Sample Type Matrix; 7) Sample Container Type; 8) Sample Analysis Requested; 9) Name(s) and signature(s) of sampler(s); and 10) Signature(s) of any individual(s) with custody of samples.

A separate chain-of-custody form must accompany each cooler for each daily shipment. The chain-of-custody form must address all samples in that cooler, but not address samples in any other cooler. This practice maintains the chain-of-custody for all samples in case of mis-shipment.

**Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal):** Within the laboratory, the person responsible for sample receipt must sign and date the chain-of-custody form; verify that custody seals are intact on shipping containers; compare samples received against those listed on the chain-of-custody form; examine all samples for possible shipping damage and improper sample preservation; note on the chain-of-custody record that specific samples were damaged, if any; notify sampling personnel as soon as possible so that appropriate samples may be regenerated; verify that sample holding times have not been exceeded; maintain laboratory chain-of-custody documentation; and place the samples in the appropriate laboratory storage. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

**Sample Identification Procedures:** Tetra Tech START personnel will assign unique sample IDs to each sample. A unique laboratory identifier will be assigned to each sample during sample login.

Chain-of-custody Procedures: Tetra Tech SOP No. 019, Packaging and Shipping Samples

**QAPP Worksheet #28 A QC Samples Table - Volatile - Organics/CLP SOM01.2**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Volatile Organics
<b>Concentration Level</b>	Low / medium(ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 every 12 hours	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL*	
Matrix Spike (Not Required)	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	61-145 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene	61-145 %R
		Benzene	76-127 %R				Benzene	76-127 %R
		Trichloroethene	71-120 %R				Trichloroethene	71-120 %R
		Toluene	76-125 %R				Toluene	76-125 %R
		Chlorobenzene	75-130 %R				Chlorobenzene	75-130 %R
Matrix Spike Duplicate (Not Required)	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	0-14 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	1,1-Dichloroethene	0-14 %RPD
		Benzene	0-11 %RPD				Benzene	0-11 %RPD
		Trichloroethene	0-14 %RPD				Trichloroethene	0-14 %RPD
		Toluene	0-13 %RPD				Toluene	0-13 %RPD
		Chlorobenzene	0-13 %RPD				Chlorobenzene	0-13 %RPD
Deuterated Monitoring Compounds	all samples	Vinyl chloride-d3	65-131 %R	Check calculations and instruments, reanalyze affected samples; see asterisk below	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Vinyl chloride-d3	65-131 %R
		Chloroethane-d5	71-131 %R				Chloroethane-d5	71-131 %R

**QAPP Worksheet #28 A QC Samples Table - Volatile - Organics/CLP SOM01.2 (cont.)**  
 (UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Volatile Organics (cont.)
<b>Concentration Level</b>	Low / medium(ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,1-Dichloroethene-d2	55-104 %R	Check calculations and instruments, reanalyze affected samples; *up to 3 DMCs per sample may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene-d2	55-104 %R
		2-Butanone-d5	49-155 %R				2-Butanone-d5	49-155 %R
		Chloroform-d	78-121 %R				Chloroform-d	78-121 %R
		1,2-Dichloroethane-d4	78-129 %R				1,2-Dichloroethane-d4	78-129 %R
		Benzene-d6	77-124 %R				Benzene-d6	77-124 %R
		1,2-Dichloropropane-d6	79-124 %R				1,2-Dichloropropane-d6	79-124 %R
		Toluene-d8	77-121 %R				Toluene-d8	77-121 %R
		trans-1,3-Dichloropropene-d4	73-121 %R				trans-1,3-Dichloropropene-d4	73-121 %R
		2-Hexanone-d5	28-135 %R				2-Hexanone-d5	28-135 %R
		1,4-Dioxane-d8	50-150 %R				1,4-Dioxane-d8	50-150 %R
		1,1,2,2-Tetrachloroethane-d2	73-125 %R				1,1,2,2-Tetrachloroethane-d2	73-125 %R



**QAPP Worksheet #28 A QC Samples Table - Volatile - Organics/CLP SOM01.2 (cont.)**  
 (UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Volatile Organics (cont.)
<b>Concentration Level</b>	Low / medium(ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,1-Dichloroethene-d2	55-104 %R	Check calculations and instruments, reanalyze affected samples; *up to 3 DMCs per sample may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene-d2	55-104 %R
		2-Butanone-d5	49-155 %R				2-Butanone-d5	49-155 %R
		Chloroform-d	78-121 %R				Chloroform-d	78-121 %R
		1,2-Dichloroethane-d4	78-129 %R				1,2-Dichloroethane-d4	78-129 %R
		Benzene-d6	77-124 %R				Benzene-d6	77-124 %R
		1,2-Dichloropropane-d6	79-124 %R				1,2-Dichloropropane-d6	79-124 %R
		Toluene-d8	77-121 %R				Toluene-d8	77-121 %R
		trans-1,3-Dichloropropene-d4	73-121 %R				trans-1,3-Dichloropropene-d4	73-121 %R
		2-Hexanone-d5	28-135 %R				2-Hexanone-d5	28-135 %R
		1,4-Dioxane-d8	50-150 %R				1,4-Dioxane-d8	50-150 %R
		1,1,2,2-Tetrachloroethane-d2	73-125 %R				1,1,2,2-Tetrachloroethane-d2	73-125 %R

**QAPP Worksheet #28 A QC Samples Table - Volatile - Organics/CLP SOM01.2 (cont.)**  
 (UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Volatile Organics (cont.)
<b>Concentration Level</b>	Low / medium(ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,2-Dichlorobenzene-d4	80-131 %R	Check calculations and instruments, reanalyze affected samples; *up to 3 DMCs per sample may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,2-Dichlorobenzene-d4	80-131 %R
Internal Standards	all samples	60-140%		Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	± 40 % of response area, ± 20 sec retention time shift	

**QAPP Worksheet #28 B QC Samples Table – Semivolatile - Organics/CLP SOM01.2**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Semivolatile Organics
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per ≤ 20 samples OR whenever samples extracted	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL	
Matrix Spike (Not Required)	1 per ≤ 20 samples; if requested	Phenol	12-110 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol	12-110 %R
		2-Chlorophenol	27-123 %R				2-Chlorophenol	27-123 %R
		N-Nitroso-di-n-propylamine	41-116 %R				N-Nitroso-di-n-propylamine	41-116 %R
		4-Chloro-3-methylphenol	23-97 %R				4-Chloro-3-methylphenol	23-97 %R
		Acenaphthene	46-118 %R				Acenaphthene	46-118 %R
		4-Nitrophenol	29-94 %R				4-Nitrophenol	29-94 %R
		2,4-Dinitrotoluene	24-96 %R				2,4-Dinitrotoluene	24-96 %R
		Pentachlorophenol	9-103 %R				Pentachlorophenol	9-103 %R
		Pyrene	26-127 %R				Pyrene	26-127 %R

\*with the exception of bis (2-Ethylhexyl) phthalate which can be up to 5 times the CRQL. (USEPA CLP Nat'l Functional Guidelines, Final, July 2007)

**QAPP Worksheet #28 B QC Samples Table - Semivolatile - Organics/CLP SOM01.2 (cont.)**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Semivolatile Organics (cont.)
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Matrix Spike Duplicate (Not Required)	1 per ≤ 20 samples; if requested	Phenol	0-42 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	Phenol	0-42 %RPD
		2-Chlorophenol	0-40 %RPD				2-Chlorophenol	0-40 %RPD
		N-Nitroso-di-n-propylamine	0-38 %RPD				N-Nitroso-di-n-propylamine	0-38 %RPD
		4-Chloro-3-methylphenol	0-42 %RPD				4-Chloro-3-methylphenol	0-42 %RPD
		Acenaphthene	0-31 %RPD				Acenaphthene	0-31 %RPD
		4-Nitrophenol	0-50 %RPD				4-Nitrophenol	0-50 %RPD
		2,4-Dinitrotoluene	0-38 %RPD				2,4-Dinitrotoluene	0-38 %RPD
		Pentachlorophenol	0-50 %RPD				Pentachlorophenol	0-50 %RPD
		Pyrene	0-31 %RPD				Pyrene	0-31 %RPD
Deuterated Monitoring Compounds	all samples	Phenol-d5	39-106 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol-d5	39-106 %R
		Bis(2-chloroethyl)ether-d8	40-105 %R				Bis(2-chloroethyl)ether-d8	40-105 %R
		2-Chlorophenol-d4	41-106 %R				2-Chlorophenol-d4	41-106 %R

**QAPP Worksheet #28 B QC Samples Table - Semivolatile - Organics/CLP SOMO1.2 (cont.)**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Semivolatile Organics (cont.)
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	4-Methylphenol-d8	25-111 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	4-Methylphenol-d8	25-111 %R
		Nitrobenzene-d5	43-108 %R				Nitrobenzene-d5	43-108 %R
		2-Nitrophenol-d4	40-108 %R				2-Nitrophenol-d4	40-108 %R
		2,4-Dichlorophenol-d3	37-105 %R				2,4-Dichlorophenol-d3	37-105 %R
		4-Chloroaniline-d4	1-145 %R				4-Chloroaniline-d4	1-145 %R
		Dimethylphthalate-d6	47-114 %R				Dimethylphthalate-d6	47-114 %R
		Acenaphthylene-d8	41-107 %R				Acenaphthylene-d8	41-107 %R
		4-Nitrophenol-d4	33-116 %R				4-Nitrophenol-d4	33-116 %R
		Fluorene-d10	42-111 %R				Fluorene-d10	42-111 %R
		4,6-Dinitro-2-methylphenol-d2	22-104 %R				4,6-Dinitro-2-methylphenol-d2	22-104 %R
		Anthracene-d10	44-110 %R				Anthracene-d10	44-110 %R
		Pyrene-d10	52-119 %R				Pyrene-d10	52-119 %R

**QAPP Worksheet #28 B QC Samples Table - Semivolatile - Organics/CLP SOMO1.2 (cont.)**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Semivolatile Organics (cont.)
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	Benzo(a)pyrene-d12	32-121 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Benzo(a)pyrene-d12	32 - 121 %R
Internal Standards	all samples	50-100% of area, $\pm$ 20 sec retention time shift		Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	50-100% of area, $\pm$ 20 sec retention time shift	

**QAPP Worksheet #28 C QC Samples Table - Pesticides- Organics/CLP SOM01.2**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Pesticides
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per $\leq 20$ samples OR whenever samples extracted	No analyte > CRQL		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	No analyte > CRQL	
Matrix Spike	1 per $\leq 20$ samples; if requested	gamma-BHC (Lindane)	56-123 %R	Flag outliers	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	gamma-BHC (Lindane)	56-123 %R
		Heptachlor	40-131 %R				Heptachlor	40-131 %R
		Aldrin	40-120 %R				Aldrin	40-120 %R
		Dieldrin	52-126 %R				Dieldrin	52-126 %R
		Endrin	56-121 %R				Endrin	56-121 %R
		4,4'-DDT	38-127 %R				4,4'-DDT	38-127 %R
Matrix Spike Duplicate	1 per $\leq 20$ samples; if requested	gamma-BHC	0-15 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/ECD Technician	Precision	gamma-BHC	0-15 %RPD
		Heptachlor	0-20 %RPD				Heptachlor	0-20 %RPD
		Aldrin	0-22 %RPD				Aldrin	0-22 %RPD
		Dieldrin	0-18 %RPD				Dieldrin	0-18 %RPD
		Endrin	0-21 %RPD				Endrin	0-21 %RPD
		4,4'-DDT	0-27 %RPD				4,4'-DDT	0-27 %RPD
Laboratory Control Sample	1 per $\leq 20$ samples	gamma-BHC	50-120 %R	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	gamma-BHC	50-120 %R

**QAPP Worksheet #28 C QC Samples Table - Pesticides- Organics/CLP SOM01.2 (cont.)**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List Pesticides (cont.)
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Laboratory Control Sample [cont'd]	1 per $\leq$ 20 samples	Heptachlor epoxide	50-150 %R	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	Heptachlor epoxide	50-150 %R
Laboratory Control Sample [cont'd]	1 per $\leq$ 20 samples	Dieldrin	30-130 %R	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	Dieldrin	30-130 %R
		4,4'-DDE	50-150 %R				4,4'-DDE	50-150 %R
		Endrin	50-120 %R				Endrin	50-120 %R
		Endosulfan sulfate	50-120 %R				Endosulfan sulfate	50-120 %R
		gamma-Chlordane	30-130 %R				gamma-Chlordane	30-130 %R
Surrogate	all samples		30-150 %R	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy		30-150 %R



**QAPP Worksheet #28 D QC Samples Table – PCBs - Organics/CLP SOMO1.2**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Compound List PCBs
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">SOM01.2</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per $\leq$ 20 samples OR whenever samples extracted	No analyte > CRQL		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	No analyte > CRQL	
Matrix Spike	1 per $\leq$ 20 samples; if requested	Aroclor-1016	29-135 %R	Flag outliers	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	Aroclor-1016	29-135 %R
		Aroclor-1260	29-135 %R				Aroclor-1260	29-135 %R
Matrix Spike Duplicate	1 per $\leq$ 20 samples; if requested	Aroclor-1016	0-15 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/ECD Technician	Precision	Aroclor-1016	0-15 %RPD
		Aroclor-1260	0-20 %RPD				Aroclor-1260	0-20 %RPD
Laboratory Control Sample	1 per $\leq$ 20 samples	Aroclor-1016	50-150 %R	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy	Aroclor-1016	50-150 %R
		Aroclor-1260	50-150 %R				Aroclor-1260	50-150 %R
Surrogate	all samples		30-150 %R	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy		30-150 %R

**QAPP Worksheet #28 E QC Samples Table – TAL Metals- Inorganics/CLP ILM05.4**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Analyte List Inorganics Metals
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank	1 per $\leq 20$ samples	No constituent > CRQL	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	No constituent > CRQL
Spike	1 per $\leq 20$ samples	75-125%R*	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R*
Duplicate	1 per $\leq 20$ samples	$\pm 20\%$ RPD**	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Precision	$\pm 20\%$ RPD**
Post-Digestion Spike	after any analyte (except Ag and Hg) fails spike %R	75-125%R	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R
Interference Check Sample [ICP Analysis Only]	beginning, end and periodically (not less than once per 20 samples)	$\pm 2$ times CRQL of true value or $\pm 20\%$ of true value, whichever is greater	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Sensitivity	$\pm 2$ times CRQL of true value or $\pm 20\%$ of true value, whichever is greater

\*except when the sample concentration is greater than 4 times the spike concentration, then disregard the recoveries; no data validation action taken

\*\*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

\*\*except when the sample and/or duplicate concentration is less than 5 times the CRQL, then  $\pm$  CRQL.

**QAPP Worksheet #28 E QC Samples Table – TAL Metals- Inorganics/CLP ILM05.4 (cont.)**  
 (UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous
<b>Analytical Group</b>	Target Analyte List Inorganics Metals (cont.)
<b>Concentration Level</b>	Low/Medium (ug/L)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

<b>Lab QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Laboratory Control Sample	1 per $\leq$ 20 samples	80-120%R (except Ag and Sb)	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	80-120%R (except Ag and Sb)

**QAPP Worksheet #28 F QC Samples Table – Total Mercury- Inorganics/CLP ILM05.4**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous					
<b>Analytical Group</b>	Target Analyte List Inorganics Total Mercury					
<b>Concentration Level</b>	Low/Medium (ug/L)					
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP					
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a> – Cold Vapor Atomic Absorption (CVAA)					
<b>Sampler's Name</b>	Kevin Scott					
<b>Field Sampling Organization</b>	Tetra Tech					
<b>Analytical Organization</b>	EPA CLP RAS Laboratory					
<b>No. of Sample Locations</b>	2					
<b>Lab QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Preparation Blank (PB)	1 per $\leq$ 20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per $\leq$ 20 samples	$\pm$ 20% RPD*	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	$\pm$ 20% RPD
Spike Sample	1 per $\leq$ 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R

**QAPP Worksheet #28 G QC Samples Table – Total Cyanide- Inorganics/CLP ILM05.4**  
 (UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Aqueous					
<b>Analytical Group</b>	Target Analyte List Inorganics Total Cyanide					
<b>Concentration Level</b>	Low/Medium (ug/L)					
<b>Sampling SOP(s)</b>	Tetra Tech EMI Groundwater Sampling SOP					
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a> – Colorimeter or Spectrophotometer					
<b>Sampler's Name</b>	Kevin Scott					
<b>Field Sampling Organization</b>	Tetra Tech					
<b>Analytical Organization</b>	EPA CLP RAS Laboratory					
<b>No. of Sample Locations</b>	2					
<b>Lab QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Preparation Blank (PB)	1 per $\leq$ 20 samples	No analyte > CRQL	Suspend analysis; redistill and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per $\leq$ 20 samples	$\pm$ 20% RPD*	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	$\pm$ 20% RPD
Spike Sample	1 per $\leq$ 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R

**QAPP Worksheet #28 H QC Samples Table – TAL Metals- Inorganics/CLP ILM05.4**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Soil
<b>Analytical Group</b>	Target Analyte List Inorganics – Metals
<b>Concentration Level</b>	Low/Medium (mg/kg)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Soil Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank	1 per $\leq 20$ samples	No constituent > CRQL	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	No constituent > CRQL
Spike	1 per $\leq 20$ samples	75-125%R*	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R*
Duplicate	1 per $\leq 20$ samples	$\pm 20\%$ RPD**	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Precision	$\pm 20\%$ RPD**
Post-Digestion Spike	after any analyte (except Ag and Hg) fails spike %R	75-125%R	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R
Interference Check Sample [ICP Analysis Only]	beginning, end and periodically during run (2 times every 8 hours)	Within $\pm 2$ times CRQL of true value or $\pm 20\%$ of true value, whichever is greater	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Sensitivity	Within $\pm 2$ times CRQL of true value or $\pm 20\%$ of true value, whichever is greater

\*except when the sample concentration is greater than 4 times the spike concentration, then disregard the recoveries; no data validation action taken

\*\*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

\*\*except when the sample and/or duplicate concentration is less than 5 times the CRQL, then  $\pm$  CRQL.

**QAPP Worksheet #28 H QC Samples Table – TAL Metals- Inorganics/CLP ILM05.4 (cont.)**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Soil
<b>Analytical Group</b>	Target Analyte List Inorganics – Metals (cont.)
<b>Concentration Level</b>	Low/Medium (mg/kg)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Soil Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a>
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

<b>Lab QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Laboratory Control Sample	1 per $\leq$ 20 samples	Control limits established by EPA*	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	Control limits established by EPA*

\* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

**QAPP Worksheet #28 I QC Samples Table – Total Mercury- Inorganics/CLP ILM05.4**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Soil
<b>Analytical Group</b>	Target Analyte List Inorganics – Total Mercury
<b>Concentration Level</b>	Low/Medium (mg/kg)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Soil Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a> Cold Vapor Atomic Absorption (CVAA)
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per $\leq 20$ samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per $\leq 20$ samples	$\pm 20\%$ RPD	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	$\pm 20\%$ RPD
Spike Sample	1 per $\leq 20$ samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R
Laboratory Control Sample	1 $\leq 20$ samples	Control limits established by EPA*	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	Control limits established by EPA*

\* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.



**QAPP Worksheet #28 J QC Samples Table – Total Cyanide- Inorganics/CLP ILM05.4**  
(UFP-QAPP Manual Section 3.4)

<b>Matrix</b>	Soil
<b>Analytical Group</b>	Target Analyte List Inorganics – Total cyanide
<b>Concentration Level</b>	Low/Medium (mg/kg)
<b>Sampling SOP(s)</b>	Tetra Tech EMI Soil Sampling SOP
<b>Analytical Method/SOP Reference</b>	<a href="#">ILM05.4</a> Colorimeter or Spectrophotometer
<b>Sampler's Name</b>	Kevin Scott
<b>Field Sampling Organization</b>	Tetra Tech
<b>Analytical Organization</b>	EPA CLP RAS Laboratory
<b>No. of Sample Locations</b>	2

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per $\leq 20$ samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per $\leq 20$ samples	$\pm 20\%$ RPD	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	$\pm 20\%$ RPD
Spike Sample	1 per $\leq 20$ samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R
Laboratory Control Sample	1 $\leq 20$ samples	Control limits established by EPA*	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	Control limits established by EPA*

\* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

**QAPP Worksheet #29**

(UFP-QAPP Manual Section 3.5.1)

**Project Documents and Records Table**

<b>Sample Collection Documents and Records</b>	<b>Analysis Documents and Records Analysis Documents and Records</b>	<b>Data Assessment Documents and Records</b>	<b>Other</b>
<ul style="list-style-type: none"><li>• Site and field logbooks</li><li>• Boring logs</li><li>• Well construction diagrams</li><li>• COC forms</li><li>• Well Data Sheets</li><li>• Field Data Sheets</li><li>• GIS map for sampling locations</li><li>• Incident Action plan</li></ul>	<ul style="list-style-type: none"><li>• Sample receipt logs</li><li>• Internal and external COC forms</li><li>• Equipment calibration logs</li><li>• Sample preparation worksheets/logs</li><li>• Sample analysis worksheets/run logs</li><li>• Telephone/email logs</li></ul> Corrective action documentation	<ul style="list-style-type: none"><li>• Data validation reports</li><li>• Field inspection checklist(s)</li><li>• Laboratory Audit checklist (if performed)</li><li>• Review forms for electronic entry of data into database</li><li>• Corrective action documentation</li><li>• Laboratory Final Data</li></ul>	CLP/non-CLP request form

# QAPP Worksheet #30

(UFP-QAPP Manual Section 3.5.2.3)

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Aqueous	VOCs	Low/medium	<a href="#">SOM01.2</a>	35 days	EPA CLP RAS or non-RAS Laboratory	NA
	SVOCs	Low/medium	<a href="#">SOM01.2</a>	35 days		
	PCBs	Low/medium	<a href="#">SOM01.2</a>	35 days		
	Pesticides	Low/medium	<a href="#">SOM01.2</a>	35 days		
	TAL Metals and Cyanide	Low/medium	<a href="#">ILM05.4</a>	35 days		
Soil	TCL VOCs	Low/medium	<a href="#">SOM01.2</a>	35 days	EPA CLP RAS or non-RAS Laboratory	NA
	TCL SVOCs	Low/medium	<a href="#">SOM01.2</a>	35 days		NA
	TCL PCBs	Low/medium	<a href="#">SOM01.2</a>	35 days		NA
	TCL Pesticides	Low/medium	<a href="#">SOM01.2</a>	35 days		NA
	TAL Total Metals	Low/medium	<a href="#">ILM05.4</a>	35 days		NA

**QAPP Worksheet #31**

(UFP-QAPP Manual Section 4.1.1)

**Planned Project Assessments Table**

<b>Assessment Type</b>	<b>Frequency</b>	<b>Internal or External</b>	<b>Organization Performing Assessment</b>	<b>Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)</b>	<b>Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)</b>	<b>Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)</b>	<b>Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)</b>
Laboratory Technical Systems	Every Year	External	Regulatory Agency	Regulatory Agency	Non-CLP (NELAC) Laboratory	Non-CLP (NELAC) Laboratory	EPA or other Regulatory Agency
Performance Audit*		External	Regulatory Agency	Regulatory Agency	Non-CLP (NELAC) Laboratory	Non-CLP (NELAC) Laboratory	EPA or other Regulatory Agency
Performance Evaluation Samples**		External	Regulatory Agency	Regulatory Agency	Non-CLP (NELAC) Laboratory	Non-CLP (NELAC) Laboratory	EPA or other Regulatory Agency
On-Site Field Inspection	Project Specific	Internal	Tetra Tech	Regulatory Agency	Sampling and Monitoring Plan Coordinator	Safety Officer	EPA or other Regulatory Agency

**QAPP Worksheet #32**

(UFP-QAPP Manual Section 4.1.2)

<b>Assessment Findings and Corrective Action Responses</b>						
<b>Assessment Type</b>	<b>Nature of Deficiencies Documentation</b>	<b>Individual(s) Notified of Findings (Name, Title, Organization)</b>	<b>Timeframe of Notification</b>	<b>Nature of Corrective Action Response Documentation</b>	<b>Individual(s) Receiving Corrective Action Response (Name, Title, Org.)</b>	<b>Timeframe for Response</b>
Project Readiness Review	Checklist or logbook entry summary	Sampling and Monitoring Plan Coordinator	Immediately to within 24 hours of review	Checklist or logbook entry	Alicia Shultz, Project Manager, START	7 days after receiving notification
Field Observations / Deviations from Work Plan	Logbook	Sampling and Monitoring Plan Coordinator	Immediately to within 24 hours of deviation	Logbook	Alicia Shultz, Project Manager, START	Within 24 hours of change
Laboratory Technical Systems/ Performance Audits	Written Report	Laboratory QAO	30 days	Letter	Analytical Coordinator/QAC	7 days after receiving notification

**QAPP Worksheet #33**

(UFP-QAPP Manual Section 4.2)

**QA Management Reports Table**

<b>Type of Report</b>	<b>Frequency (daily, weekly monthly, quarterly, annually, etc.)</b>	<b>Projected Delivery Date(s)</b>	<b>Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)</b>	<b>Report Recipient(s) (Title and Organizational Affiliation)</b>
Site Specific QAPP	As performed	Prior to sampling date	Sampling and Monitoring Plan Coordinator	EPA WAM
Health and Safety Plan	As performed	Prior to sampling date	Safety Officer	EPA WAM
On-Site Field Inspection	As performed	7 calendar days after completion of the inspection	Safety Officer	EPA WAM
Field Change Request	As required per field change	Three days after identification of need for field change	Data Assessment and Interpretation Coordinator	EPA WAM
Laboratory Data (Preliminary)	As performed	ASAP after receipt of preliminary data	Analytical Coordinator	Quality Assurance Coordinator
Final Report	Project Specified	4 weeks after receipt of EPA approval of data package	Quality Assurance Coordinator and Environmental Unit Leader	EPA WAM

**QAPP Worksheet #34**

(UFP-QAPP Manual Section 5.2.1)

**Verification (Step I) Process Table**

<b>Verification Input</b>	<b>Description</b>	<b>Internal/ External</b>	<b>Responsible for Verification (Name, Organization)</b>
Site/field logbooks	Field notes will be prepared daily by the START Sample Leader and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	START
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	START
Sampling Trip Reports	STRs will be prepared for each week of field sampling [for which samples are sent to an EPA CLP RAS laboratory.] Information in the STR will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	I	START
Laboratory Preliminary Data	Preliminary data – limited review for either contract compliance or technical compliance.	I/E	START/ESAT
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	I/E	START/ESAT
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by EPA.	I/E	START/ESAT
Final Sample Report	The project data results will be compiled in a sample report for the project. Entries will be reviewed/verified against hardcopy information.	I/E	START/ESAT

**QAPP Worksheet #35**

(UFP-QAPP Manual Section 5.2.2)

**Validation (Steps IIa and IIb) Process Table**

<b>Step IIa/IIb</b>	<b>Validation Input</b>	<b>Description</b>	<b>Responsible for Validation (Name, Organization)</b>
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	Sampling and Monitoring Plan Coordinator and Quality Assurance Coordinator
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	Environmental Unit Leader
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	Analytical Coordinator
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	Quality Assurance Coordinator
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	Quality Assurance Coordinator and Assistant Environmental Unit Leader
IIb	Field duplicates*	Compare results of field duplicate (or replicate) analyses with RPD criteria	Quality Assurance Coordinator



**QAPP Worksheet #36**

(UFP-QAPP Manual Section 5.2.2)

**Validation (Steps IIa and IIb) Summary Table**

<b>Step IIa/IIb</b>	<b>Matrix</b>	<b>Analytical Group</b>	<b>Concentration Level</b>	<b>Validation Criteria</b>	<b>Data Validator (title and organizational affiliation)</b>
IIa / IIb	Soil/ Aqueous	VOCs	Low and Medium	Data Validation SOP for Organic Analysis of Low/Medium Concentration VOCs under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
IIa / IIb	Soil/ Aqueous	SVOCs	Low and Medium	Data Validation SOP for Organic Analysis of Low/Medium Concen. SVOCs under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel,
IIb	Soil/ Aqueous	Pesticides	Low and Medium	Data Validation SOP for Organic Analysis of Low/Medium Concentration Pesticides under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel,



Alicia Shultz  
Project Manager

January 24, 2011

Mr. Ildefonso Acosta  
Site Assessment Manager  
U.S. Environmental Protection Agency Region 2  
290 Broadway  
New York, New York 10007

<b>Subject:</b>	<b>Draft Quality Assurance Project Plan - Riverside Avenue Site</b>
<b>Contract:</b>	<b>EPA Region 7 START, Region 2 Crossover</b>
<b>Contract No.:</b>	<b>EP-S7-06-01</b>
<b>Task:</b>	<b>0115</b>

Dear Mr. Acosta:

Tetra Tech EM Inc. (Tetra Tech) is submitting the draft site-specific Quality Assurance Project Plan for the Riverside Avenue site sampling investigation. If you have any questions regarding this report, please call me at (518) 356-3793 or [Alicia.Shultz@tetrattech.com](mailto:Alicia.Shultz@tetrattech.com).

Sincerely,

A handwritten signature in black ink that reads 'Alicia Shultz'.

Alicia Shultz  
Project Manager

Enclosure

cc: TDD File

### QAPP Worksheet #37

(UFP-QAPP Manual Section 5.2.3)

#### Usability Assessment

**Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:**

Data, whether generated in the field or by the laboratory, are tabulated and reviewed for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCCS) by the SPM for field data or the data validator for laboratory data. The review of the PARCC Data Quality Indicators (DQI) will compare with the DQO detailed in the site-specific QAPP, the analytical methods used and impact of any qualitative and quantitative trends will be examined to determine if bias exists. A hard copy of field data is maintained in a designated field or site logbook. Laboratory data packages are validated, and final data reports are generated. All documents and logbooks are assigned unique and specific control numbers to allow tracking and management.

Questions about Non-CLP data, as observed during the data review process, are resolved by contacting the respective site personnel and laboratories as appropriate for resolution. All communications are documented in the data validation record with comments as to the resolution to the observed deficiencies.

Where applicable, the following documents will be followed to evaluate data for fitness in decision making: EPA QA/G-4, *Guidance on Systematic Planning using the Data Quality Objectives Process*, EPA/240/B-06/001, February 2006, and EPA QA/G-9R, *Guidance for Data Quality Assessment, A reviewer's Guide* EPA/240/B-06/002, February 2006.

Describe the evaluative procedures used to assess overall measurement error associated with the project: As delineated in the *Uniform Federal Policy for Implementing Environmental Quality Systems: Evaluating, Assessing and Documenting Environmental Data Collection and Use Programs Part 1: UFP-QAPP (EPA-505-B-04-900A, March 2005); Part 2A: UFP-QAPP Workbook (EPA-505-B-04-900C, March 2005); Part 2B: Quality Assurance/Quality Control Compendium: Non-Time Critical QA/QC Activities (EPA-505-B-04-900B, March 2005)*; "Graded Approach" will be implemented for data collection activities that are either exploratory or small in nature or where specific decisions cannot be identified, since this guidance indicates that the formal DQO process is not necessary.

The data will be evaluated to determine whether they satisfy the PQO for the project. The validation process determines if the data satisfy the QA criteria. After the data pass the data validation process, comparison results with the PQO is done. The analytical results will be evaluated to determine if concentrations are adequately documented. In cases where concentrations are qualified as estimated, the sampling location may be re-sampled to provide more accurate data. For example, if many of the background samples have concentrations that are estimated, the location may be re-sampled to provide more accurate background concentrations required for HRS.

Identify the personnel responsible for performing the usability assessment: Site Project Management Team, Environmental Unit Leader, Data Validation Personnel, and EPA Region 2 OSC

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies: copy of the most current approved QAPP, including any graphs, maps and text reports developed will be provided to all personnel identified on the distribution list.

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